Exhibit 14.09

United States' Motion to Enter Consent Decree,
United States v. Alden Leeds, Inc. et al., Civil Action No. 22-7326 (D.N.J.)

EXHIBIT A-36

Appendix A to OxyChem's Comments in Opposition to Proposed Consent Decree,
United States v. Alden Leeds, Inc., et al., Civil Action No. 2:22-cv-07326 (D.N.J.)

New Jersey Department of Environmental Protection
Site Remediation and Waste Management Program

ALTERNATIVE OR NEW REMEDIATION STANDARD AND/OR SCREENING LEVEL APPLICATION FORM

Date Stamp
(For Department use only)

NOTE: This form shall be completed for all contaminants for which a direct contact exposure pathway alternative or new remediation standard, alternative impact to ground water soil remediation standard, alternative vapor intrusion screening level, ecological risk-based remediation goal, and/or ecological risk management decision goal is being implemented and/or requested for a site or area of concern. The form shall be used regardless of whether Department pre-approval is required.

SECTION A. SITE NAME AND LOCATION

Site Name: Block 165 Portion of the Former RCA Facility

List all AKAs: Former RCA Site

Street Address: Between Bergen and Sussex Streets and Between 6th and 7th Streets (tax block 165, lots 1-36)

Municipality: Town of Harrison (Township, Borough or City)

County: Hudson Zip Code: 07029

Program Interest (PI) Number(s): 640228

Case Tracking Number(s):

SECTION B. REMEDIATION STANDARD NOTIFICATION SPREADSHEET

Complete and attach the Remediation Standard Notification Spreadsheet which can be found at: http://www.nj.gov/dep/srp/srra/forms/. This form will not be processed by the NJDEP if the spreadsheet is not attached.

SECTION C. PURPOSE FOR SUBMISSION

Pre-Approval Required:

- ☐ Ingestion/Dermal Alternative Soil Remediation Standard
- ☐ Inhalation Alternative Soil Remediation Standard (New Toxicity Data, New Modeling, etc.)
- ☐ Development of New Remediation Standard
- ☐ Ecological Risk Based Remediation Goal
- ☐ Ecological Risk Management Decision Goal

No Pre-Approval Required:

- ☐ Inhalation Alternative Soil Remediation Standard (Calculation Spreadsheet)
- ☐ Impact to Groundwater Alternative Soil Remediation Standard
- ☒ Vapor Intrusion Alternative Screening Level
- ☐ Development of New Vapor Intrusion Screening Level

SECTION D. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: General Electric Company

Representative First Name: Lewis Representative Last Name: Streeter

Title: Senior Project Manager - Remediation

Phone Number: (518) 388-7552 Ext: Fax:

Mailing Address: 1 River Road Bldg 5-7 W

City/Town: Schenectady State: NY Zip Code: 12345

Email Address: Lewis.Streeter@ge.com

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Date: 03/25/2019

Name/Title: Lewis Streeter / Senior Project Manager - Remediation

SECTION E. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 575494

First Name: Christopher Last Name: Motta

Phone Numbers: (201) 398-4380 Ext.: Fax: (201) 797-4399

Mailing Address: 17-17 Route 208 North, 2nd Floor

Municipality: Fair Lawn State: NJ Zip Code: 07410

Email Address: christopher.motta@arcadis.com

This statement shall be signed by the LSRP who is submitting this notification in accordance with N.J.S.A. 58:10C-14, and N.J.S.A. 58:10B-1.3b(1) and (2).

(1) I certify, as a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C-1 et seq. to conduct business in New Jersey, that for the remediation described in this submission, and all attachments included in this submission, I personally: Managed, supervised, or performed the remediation conducted at this site that is described in this submission, and all attachments included in this submission; and/or periodically reviewed and evaluated the work performed by other persons that forms the basis for the information in this submission; and/or completed the work of another site remediation professional, licensed or not, after having: (1) reviewed all available documentation on which I relied; (2) conducted a site visit and observed the then-current conditions and verified the status of as much of the work as was reasonably observable; and (3)concluded, in the exercise of my independent professional judgment, that there was sufficient information upon which to complete any additional phase of remediation and prepare workplans and reports related thereto.

(2) I certify:

- *That I have read this submission and all attachments to this submission;*
- *That in performing the professional services as the licensed site remediation professional for the entire site or each area of concern, I adhered to the professional conduct standards and requirements governing licensed site remediation professionals provided in N.J.S.A. 58:10C-16;*
- *That the remediation conducted at the entire site or each area of concern, that is described in this submission and all attachments to this submission, was conducted pursuant to and in compliance with the remediation requirements in N.J.S.A. 58:10C-14.c;*
- *That the remediation described in this submission, and all attachments to this submission, was conducted pursuant to and in compliance with the regulations of the Site Remediation Professional Licensing Board at N.J.A.C. 7:26I; and*
- *That the information contained in this submission and all attachments to this submission is true, accurate, and complete.*

(3) I certify, when this submission includes a response action outcome, that the entire site or each area of concern has been remediated in compliance with all applicable statutes, rules, and regulations and is protective of public health and safety and the environment.

(4) I certify that no other person is authorized or able to use any password, encryption method, or electronic signature that the Board or the Department have provided to me.

(5) I certify that I understand and acknowledge that:

- *If I knowingly make a false statement, representation, or certification in any document or information I submit to the Department I may be subject to civil and administrative enforcement pursuant to N.J.S.A. 58:10C-17.a.1(a)through (f) by the Board, including but not limited to license suspension, revocation, or denial of renewal; and*
- *If I purposely, knowingly, or recklessly make a false statement, representation, or certification in any application, form, record, document or other information submitted to the Department or required to be maintained pursuant to the Site Remediation Reform Act, I shall be guilty, upon conviction, of a crime of the third degree and shall, notwithstanding the provisions of subsection b. of N.J.S.2C:43-3, be subject to a fine of not less than $5,000 nor more than $75,000 per day of violation, or by imprisonment, or both.*

(6) I certify that I have read this certification prior to signing, certifying, and making this submission.

LSRP Signature:  Date: 03/25/2019

LSRP Name: Christopher J. Motta / Vice President

Company Name: Arcadis U.S., Inc.

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

New Jersey Department of Environmental Protection
Site Remediation Program

REMEDIATION STANDARD NOTIFICATION SPREADSHEET

Instructions | Clear Form

Site Name: Block 165 Portion of the Former RCA Facility

Interest Number: 640228

ALTERNATIVE STANDARDS OR SCREENING LEVELS REQUESTED/IMPLEMENTED

Chemical Name	CAS	Concentration Range on Site (include units)	ARS / Screening Level	Scenario	Type of Standard	Default Remediation Standard / Screening level (include units)	Proposed Remediation Standard / Screening level (include units)
Acetone	67-64-1	5.2 - 10.7 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	21,000,000 µg/L	43,000,000 µg/L
Benzene	71-43-2	1.6 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	20 µg/L	190 µg/L
Bromodichloromethane	75-27-4	3.5 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	2 µg/L	12 µg/L
Bromoform	75-25-2	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	300 µg/L	1,100 µg/L
Bromomethane	74-83-9	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	20 µg/L	190 µg/L
2-Butanone (methyl ethyl ketone)	78-93-3	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	2,500,000 µg/L	5,700,000 µg/L
Carbon disulfide	75-15-0	11 - 42.2 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	1,500 µg/L	15,000 µg/L
Carbon tetrachloride	56-23-5	0.51 - 41.3 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	1 µg/L	8 µg/L
Chlorobenzene	108-90-7	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	770 µg/L	7,000 µg/L
Chloroethane	75-00-3	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	26,000 µg/L	260,000 µg/L
Chloroform	67-66-3	0.27 - 30.1 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	70 µg/L	70 µg/L
Chloromethane	74-87-3	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	240 µg/L	2,300 µg/L
Cyclohexane	110-82-7	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	16,000 µg/L	180,000 µg/L
Dibromochloromethane	124-48-1	1.2 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	6 µg/L	NA
1,2-Dibromoethane	106-93-4	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	0.4 µg/L	2 µg/L
1,2-Dichlorobenzene	95-50-1	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	6,800 µg/L	52,000 µg/L
1,4-Dichlorobenzene	106-46-7	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	75 µg/L	75 µg/L
Dichlorodifluoromethane	75-71-8	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	1,000 µg/L	1,000 µg/L
1,1-Dichloroethane	75-34-3	0.43 - 0.45 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	50 µg/L	95 µg/L
1,2-Dichloroethane	107-06-2	0.49 - 4.4 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	3 µg/L	20 µg/L
1,1-Dichloroethene	75-35-4	0.58 - 0.73 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	260 µg/L	2,800 µg/L
1,2-Dichloropropane	78-87-5	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	4 µg/L	88 µg/L
cis-1,3-Dichloropropene	10061-01-5	0.35 - 40.2 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	NA	NA
trans-1,3-Dichloropropene	10061-02-6	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	NA	NA
1,3-Dichloropropene	542-75-6	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	7 µg/L	67 µg/L
Ethylbenzene	100-41-4	4.0 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	700 µg/L	700 µg/L
Freon 113	76-13-1	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	3,700 µg/L	20,000 µg/L
Methyl Tert Butyl Ether	1634-04-4	0.35 - 0.44 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	580 µg/L	3,300 µg/L
4-Methyl-2-pentanone (methyl isobutyl ketone)	108-10-1	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	920 µg/L	2,600,000 µg/L
Methylene chloride	75-09-2	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	900,000 µg/L	8,000 µg/L
Styrene	100-42-5	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	180,000 µg/L	1,600,000 µg/L
1,1,2,2-Tetrachloroethane	79-34-5	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	6 µg/L	24 µg/L
Tetrachloroethene	127-18-4	0.26 - 4.7 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	31 µg/L	370 µg/L
Toluene	108-88-3	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	330,000 µg/L	3,400,000 µg/L
1,2,4-Trichlorobenzene	120-82-1	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	130 µg/L	800 µg/L
1,1,1-Trichloroethane	71-55-6	0.29 - 3.6 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	13,000 µg/L	150,000 µg/L
1,1,2-Trichloroethane	79-00-5	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	8 µg/L	49 µg/L
Trichloroethene	79-01-6	0.56 - 7,070 µg/L	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	2 µg/L	20 µg/L
Trichlorofluoromethane	75-69-4	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	2,000 µg/L	NA
Vinyl chloride	75-01-4	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	1 µg/L	1 µg/L
Xylene (total)	1330-20-7	ND	Vapor Intrusion Ground Water Screening Level	Residential	Alternative	8,600 µg/L	83,000 µg/L

Remediation Standard Notification Spreadsheet
Version 1.0 08/27/13

Ann R. Klee
Vice President
Corporate Environmental Programs

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USA

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October 30, 2014

Delegation of Authority

Pursuant to N.J. ADMIN. CODE § 7:26C-1.5(d), I, Ann R. Klee, as a responsible corporate officer for the General Electric Company (GE), hereby delegates, to the **Senior Project Manager – Remediation**, the authority to review, sign and submit reports and certifications on behalf of GE related to the Company's environmental remediation projects in New Jersey. For purposes of specificity, but without limitation, authority is delegated to review, sign and submit reports and any other documents requiring the signature or certification of a duly authorized representative. This delegation of authority is granted pursuant to the Board of Directors' resolution entitled "Execution of Contracts and Other Instruments," dated April 26, 1988.

Ann R. Klee
Vice President
Global Operations
Environment, Health and Safety

Subscribed and sworn to this 30th day of October 2014

PAUL MEDALLA
NOTARY PUBLIC
MY COMMISSION EXPIRES 5/31/18

MEMO

ARCADIS Design & Consultancy for natural and built assets

Arcadis U.S., Inc.
50 Millstone Road
East Windsor
New Jersey 08512
Tel 609 860 0590
Fax 609 860 0491

To:
Christopher Motta, LSRP

Copies:
Darren Szuch, Arcadis
David Maza, Arcadis

From:
Margaret Bartee
Michelle Turnbach

Date:
March 7, 2019

Arcadis Project No.
AP014013.1000

Subject:
Development of Alternative Ground Water Screening Levels
Block 165 Portion of the Former RCA Facility
Harrison, New Jersey
Program Interest ID: 640228

On behalf of General Electric Company (GE), Arcadis U.S., Inc. (Arcadis) has developed Alternative Ground Water Screening Levels (GWSLs) for evaluating the vapor intrusion (VI) pathway at the Block 165 Portion of the Former RCA Facility located in Harrison, New Jersey (the site). This memorandum includes a brief site description, summarizes the approach and methods for development of the Alternative GWSLs, and provides recommendations for next steps prior to use of the Alternative GWSLs.

Site Description

The site is located at 601 to 635 Sussex Street (odd numbered units) and 600 to 634 Bergen Street (even numbered units) in Harrison, Hudson County, New Jersey (Block 165, Lots 1 through 36) and was part of a former manufacturing facility operated by GE to manufacture various types of light bulbs from 1882 to 1929, and by RCA to manufacture radio tubes from 1930 to 1976. In the late 1970s, the site was subdivided into 36 lots (Lots 1 through 36) and redeveloped for residential use. Currently, 36 detached single or multi-family residences are located on the site. The current site layout is shown on **Figure 1**. Residences have garages and living spaces on the lowest level and two floors with living spaces above. In the southern portion of the block (i.e., Bergen Street residences), the lowest level is at or partially below grade. In the northern portion of the block (i.e., Sussex Street residences), the lowest level is at or above grade.

Alternative GWSL Development

The default NJDEP GWSLs are currently used to evaluate the need for VI investigation on site and in the surrounding area; however, the assumptions used to develop the default NJDEP GWSLs are more conservative than site-specific conditions. For example, the default soil type used to develop the default NJDEP GWSLs is sand; soil types in the vicinity of the site are generally characterized as silt and sand mixtures with variable amounts of gravel and clay. The NJDEP VIT Guidance includes alternative GWSLs that are greater than the default GWSLs, based on soil textures that are finer grained than the default texture (sand). Furthermore, the NJDEP GWSLs assume a depth of 5 feet from the base of the basement slab to the water table; depth to groundwater at the site ranges from approximately 14 to 26 feet below ground surface. Therefore, Arcadis developed alternative GWSLs to account for site-specific soil and groundwater conditions that reduce the potential for the VI pathway to be complete and impact indoor air quality. Consistent with the NJDEP Vapor Intrusion Technical Guidance (NJDEP 2018), site-specific soil texture data and depth to water measurements were used to develop site-specific soil type and depth to water inputs for the NJDEP Version of the Johnson and Ettinger (J&E) Spreadsheet (2013). Consistent with the Revised Instructions for the Johnson & Ettinger Spreadsheets - NJDEP Version (NJDEP 2016), default values were used for the remainder of the calculation inputs, except where updated default values for building parameters have been recommended by the United States Environmental Protection Agency (USEPA 2017). Additional information regarding the model inputs are discussed below.

Alternative GWSLs were calculated for site-related constituents of concern (COCs), which include trichloroethene (TCE), tetrachloroethene (PCE), and related chlorinated compounds, as well as additional compounds that are analyzed in site groundwater samples and currently have NJDEP GWSLs. Inhalation toxicity values are currently unavailable for dibromochloromethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and trichlorofluoromethane. Therefore, Alternative GWSLs for these compounds will be reported as “not available.”

Alternative GWSL Analytes			
Acetone	Chloroform	1,1-Dichloroethene	1,1,2,2-Tetrachloroethane
Benzene	Chloromethane	cis-/trans -1,2-Dichloroethene	Tetrachloroethene
Bromodichloromethane	Cyclohexane	1,2-Dichloropropane	Toluene
Bromoform	Dibromochloromethane	1,3-Dichloropropene	1,2,4-Trichlorobenzene
Bromomethane	1,2-Dibromoethane	Ethylbenzene	1,1,1-Trichloroethane
2-Butanone	1,2-Dichlorobenzene	Freon 113	1,1,2-Trichlorethane
Carbon disulfide	1,4-Dichlorobenzene	Methyl Tert Butyl Ether	Trichloroethene
Carbon tetrachloride	Dichlorodifluoromethane	4-Methyl-2-Pentanone	Trichlorofluoromethane
Chlorobenzene	1,1-Dichloroethane	Methylene chloride	Vinyl chloride
Chloroethane	1,2-Dichloroethane	Styrene	Xylenes (total)

Soil Texture Evaluation

Soil samples were collected and analyzed for grain size to identify a site-specific median soil texture for use in calculating Alternative GWSLs. During remedial investigation (RI) activities conducted in May-June 2017, 11 soil samples were collected from depths ranging from 2 to 22.5 feet below ground surface (bgs) at six off-site soil boring locations adjacent to the site to the north, west, and south. Soil sample locations are shown on **Figure 1.** Soil samples were collected using direct push drilling methods and analyzed for grain size by sieve analysis and by hydrometer via American Society for Testing and Materials (ASTM) Method D422 (ASTM 2007).

Soil samples for grain size analysis were not collected within the site boundaries due to equipment access limitations; however, a comparison of soil descriptions recorded in the on-site and off-site boring logs show that soil textures are consistent on site and off site. As such, grain size data obtained at off-site soil boring locations **(Figure 1)** are considered representative of site conditions and were used to calculate site-specific GWSLs for the site. Additionally, field observations recorded in the soil boring logs do not indicate the presence of distinct stratigraphic horizons in the area of the site. Native soil between ground surface and the water table are generally characterized as silt and fine to coarse sand mixtures with variable amounts of gravel and clay and are considered a single soil type. The grain size analytical report, provided in **Attachment 1**, identifies the median silt and clay content to be greater than 30%.

The NJDEP VIT Guidance (2018) recommends the use of the United States Department of Agriculture (USDA) soil classification system to quantify the relative fractions of sand, silt, and clay in evaluating soil textures for the purposes of establishing an Alternative GWSL. A 2-millimeter (mm) sieve was used to separate the gravel fraction from the fraction of each sample comprised of sand and finer grains (i.e., silt and clay), which is consistent with the USDA soil classification system. However, the method used by the laboratory, ASTM Method D422, utilizes a 0.075 mm sieve size to define the sand and silt grain size boundary, which is inconsistent with the USDA-defined sand-silt boundary of 0.050 mm. Additionally, default hydrometer analysis for ASTM Method D422 does not identify the grain size fraction relative to 0.002 mm, which is the USDA classification system silt-clay grain size boundary (see inset table below).

Laboratory Analyses	USDA Soil Classification System
% > 2 mm	% > 2 mm (gravel)
% passing 2 mm	% passing 2 mm (sand or finer)
% passing 0.075 mm	% passing 0.05 mm (silt or finer)
% passing 0.035 mm	% passing 0.002 mm (clay)
% passing 0.0032 mm	NA
% passing 0.0014 mm	NA

The laboratory-reported grain size data were used to extrapolate the fraction of each sample that is finer than 0.05 millimeters (mm) (i.e., silt and clay fraction) and 0.002 mm (i.e. clay fraction) by using linear interpolation between the two adjacent sieve sizes, as follows:

$$\%\ \text{passing}\ 0.050\ \text{mm} = \%\ \text{passing}\ 0.075\ \text{mm} - \left(\frac{\%\ \text{passing}\ 0.075\ \text{mm} - \%\ \text{passing}\ 0.035\ \text{mm}}{0.075\ \text{mm} - 0.035\ \text{mm}}\right) \times (0.075\ \text{mm} - 0.050\ \text{mm})$$

$$\%\ \text{passing 0.0020 mm} = \%\ \text{passing 0.0032 mm} - \left(\frac{\%\ \text{passing 0.0032 mm} - \%\ \text{passing 0.0014 mm}}{0.0032\ \text{mm} - 0.0014\ \text{mm}}\right) \times (0.0032\ \text{mm} - 0.0020\ \text{mm})$$

The relative percentages of gravel (percentage greater than 2 mm), sand (percentage passing 2 mm, but not 0.05 mm), silt (percentage passing 0.05 mm, but not 0.002 mm), and clay (percentage passing 0.002 mm) were then calculated for each sample.

The NJDEP VIT Guidance (2018) indicates that gravel should be removed prior to determining soil texture by passing the sample through a 2 mm sieve. The sand, silt, and clay percentages should be calculated on the remaining material. As such, the grain size data were normalized to a total of only sand, silt, and clay percentages within each sample for use in the USDA Soil Texture Calculator (available at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_054167) to identify the USDA soil classification for each sample. The estimated grain size data as defined by the USDA soil classification system; the calculated relative percentages of gravel, sand, silt, and clay in each sample; the normalized percentages of sand, silt, and clay; the median normalized percentages of sand, silt, and clay; and the soil textures calculated for each sample using the USDA Soil Texture Calculator are summarized on **Table 1**. USDA Soil Texture Calculator outputs for each sample are presented in **Attachment 2**.

A representative soil texture for the site and surrounding area was defined based on the median of soil textures identified by the USDA Soil Texture Calculator outputs for each sample and the median soil texture for the full data set. Of the 11 samples collected, the soil texture classifications for individual samples were ranked according to grain size and porosity: 4 were classified as loamy sand, 5 were classified as a sandy loam, and 2 were classified as loam, indicating a median soil texture of sandy loam. A soil texture frequency histogram is provided as **Figure 2**. Median values for the normalized relative percentages of sand and clay (the silt percentage is auto-calculated based on these inputs) (**Table 1**) were also entered into the USDA Soil Texture Calculator (**Attachment 2**) and correspond to a sandy loam soil texture. Based on the soil texture evaluation described above, a site-specific median soil texture of sandy loam was selected for use in calculating the Alternative GWSLs for the site.

Depth to Groundwater

Depth to groundwater and thickness of vadose zone soil were conservatively estimated as approximately 14.61 feet based on the shallowest average depth to water in monitoring wells RMW-01S-1, RMW-02S-1, RMW-03S-1, RMW-04S-2, MW-3 (2008), MW-04S-1, and MW-06S-1 calculated using water level measurements collected in 2017 and 2018 (**Table 2**). The monitoring well locations are shown on **Figure 1**.

Additional Model Input Parameters

Table 3 presents the residential exposure parameter values and building parameter values. These values consist of NJDEP (2013, 2016) default values for residential receptors in a basement-with-slab exposure scenario for each parameter, except (i) indoor air exchange rate (ER), (ii) crack-to-total area ratio (η), and (iii) the average vapor flow rate into the building (Q_{soil}), which are based on outdated USEPA recommendations. The USEPA released an updated spreadsheet version of the J&E model in 2017, with updated recommendations for default building parameter values (USEPA 2017). Because the NJDEP (2013, 2016) default building parameter values are based on USEPA default building parameter values, current default values for ER, η, and Q_{soil} were obtained from the USEPA Documentation for the EPA's

Implementation of the Johnson and Ettinger Model to Evaluate Site Specific Vapor Intrusion into Buildings (2017).

i. USEPA (2017) recommends a default indoor air exchange rate (ER) of 0.45 air changes per hour, based on the value recommended in the USEPA 2011 Exposure Factors Handbook (2011, 2018). This value was entered on the DATENTER page of the model workbook.

ii. USEPA (2017) recommends the use of a crack-to total area ratio (η) of 0.001 based on an approach used by radon researchers to back-calculate crack ratios using a model for soil gas flow through cracks and the results of measured soil gas flow rates into a building. Assuming a wall-floor seam crack width (w) of 0.1 centimeter (NJDEP default value), η would be 0.0004 for a building with enclosed space area of 100 square meters (NJDEP default). As such, an η of 0.001 is conservative. This value was entered on the INTERCALCS page of the model workbook, overriding other inputs, including on the DATENTER page.

iii. USEPA (2017) recommends calculating the average vapor flow rate into a building (Q_{soil}) by multiplying the building ventilation rate ($Q_{building}$) by the ratio of the average vapor flow rate into a building to the building ventilation rate (Q_{soil}:$Q_{building}$), and recommends a Q_{soil}:$Q_{building}$ value of 0.003 based on median values reported in Evaluation and Characterization of Attenuation Factors for Chlorinated Volatile Organic Compounds and Residential Buildings (USEPA 2012). Johnson (2002, 2005) also recommends this approach for estimating Q_{soil}, because inputs to $Q_{building}$ and Q_{soil}:$Q_{building}$ are more reasonably estimated based on site information, visual inspection, and or literature data than Q_{soil}. This calculation was entered on the INTERCALCS page of the model workbook and the DATENTER page, overriding other default inputs, including soil-building pressure differential (ΔP) on the DATENTER page.

The remaining building parameter values were selected using conservative (i.e., health-protective) NJDEP defaults. Of particular note is the selection of the basement-with-slab exposure scenario. Although current buildings present on the site do not have basements, the basement with slab scenario default parameters (e.g., basement depth of 200 centimeters) were selected to be protective of potential future redevelopment and construction of buildings that may include a basement. In addition, the typical residential square footage for buildings on this block is approximately 1,500 square feet (139 square meters), which is greater than the NJDEP default building area of 100 square meters. As a result, the use of the NJDEP default building area may overstate the potential for VI into the buildings.

Compound-specific physico-chemical and toxicity values are presented in **Table 4**. Default physico-chemical parameter values (e.g., molecular weight, diffusivity in air) included in the NJDEP J&E model spreadsheets were used to estimate chemical vapor transport. Consistent with the Update to the NJDEP Vapor Intrusion Screening Levels (2013), toxicity values were obtained from the USEPA hierarchy of sources in order of priority as described in the USEPA Regional Screening Levels User's Guide (USEPA 2018) and Memorandum regarding Human Health Toxicity Values in Superfund Risk Assessments (USEPA 2003). As noted above, inhalation toxicity values are currently unavailable for dibromochloromethane, cis- and trans-1,2-dichloroethene, and trichlorofluoromethane. Therefore, Alternative GWSLs could not be calculated for these compounds.

Development of Alternative GWSLs

Consistent with the Update to the NJDEP Vapor Intrusion Screening Levels (2013), values calculated using the NJDEP spreadsheet version of the J&E Model were adjusted for potential mutagenicity or

degradation, rounded to 1 or 2 significant digits, and compared to NJDEP Ground Water Quality Standards (GWQS) to develop the Alternative GWSLs, as follows:

- Health-Based Groundwater-to-Indoor Air Values for methylene chloride, TCE, and vinyl chloride were calculated by multiplying the value calculated by the NJDEP version of the J&E model by the adjustment factors of 0.40, 0.72, and 0.29, respectively.
- Health-Based Groundwater-to-Indoor Air Values for petroleum compounds (benzene, cyclohexane, ethylbenzene, styrene, toluene, and xylenes) were calculated by multiplying the values calculated by the NJDEP version of the J&E model by a factor of 10 to account for degradation.
- The Health-Based Groundwater-to-Indoor Air Values were rounded to 2 significant figures for values greater than or equal to 10, and to 1 significant figure for values less than 10, using the rounding rules utilized by NJDEP (2013) and described in Hurlburt (1994).
- When Health-Based Groundwater-to-Indoor Air Values were less than the New Jersey GWQS, the Alternative GWSLs were set at the GWQS instead of the calculated values.

Calculated Health-Based Groundwater-to-Indoor Air Values (following adjustments for potential mutagenicity or degradation and rounded), GWQS, and Alternative GWSLs are presented in **Table 5**.

Summary and Recommendations

Alternative GWSLs were calculated using the NJDEP spreadsheet version of the J&E model, site-specific soil and groundwater data, and conservative assumptions of potential future land use (i.e., potential future basements) that overstate the potential for a complete VI pathway on site under current conditions. The majority of model input values for building parameters were based on NJDEP default values. Three building parameter values were updated to reflect recent USEPA recommendations for default building parameter values. Toxicity values were also updated to reflect current values selected in accordance with the USEPA hierarchy of sources.

Analytical results of groundwater monitoring will be compared to the Alternative GWSLs to evaluate the need for VI investigation at on- and off-site properties. Although pre-approval is not required to implement these Alternative GWSLs, our experience in that the NJDEP will review Alternative GWSLs prior to site closure. As such, it is recommended that these Alternative GWSLs are submitted to the NJDEP for review during the remedial investigation phase of remediation at the site. This technical memorandum can be attached to the Alternative or New Remediation Standard and/or Screening Level Application Form to support the application.

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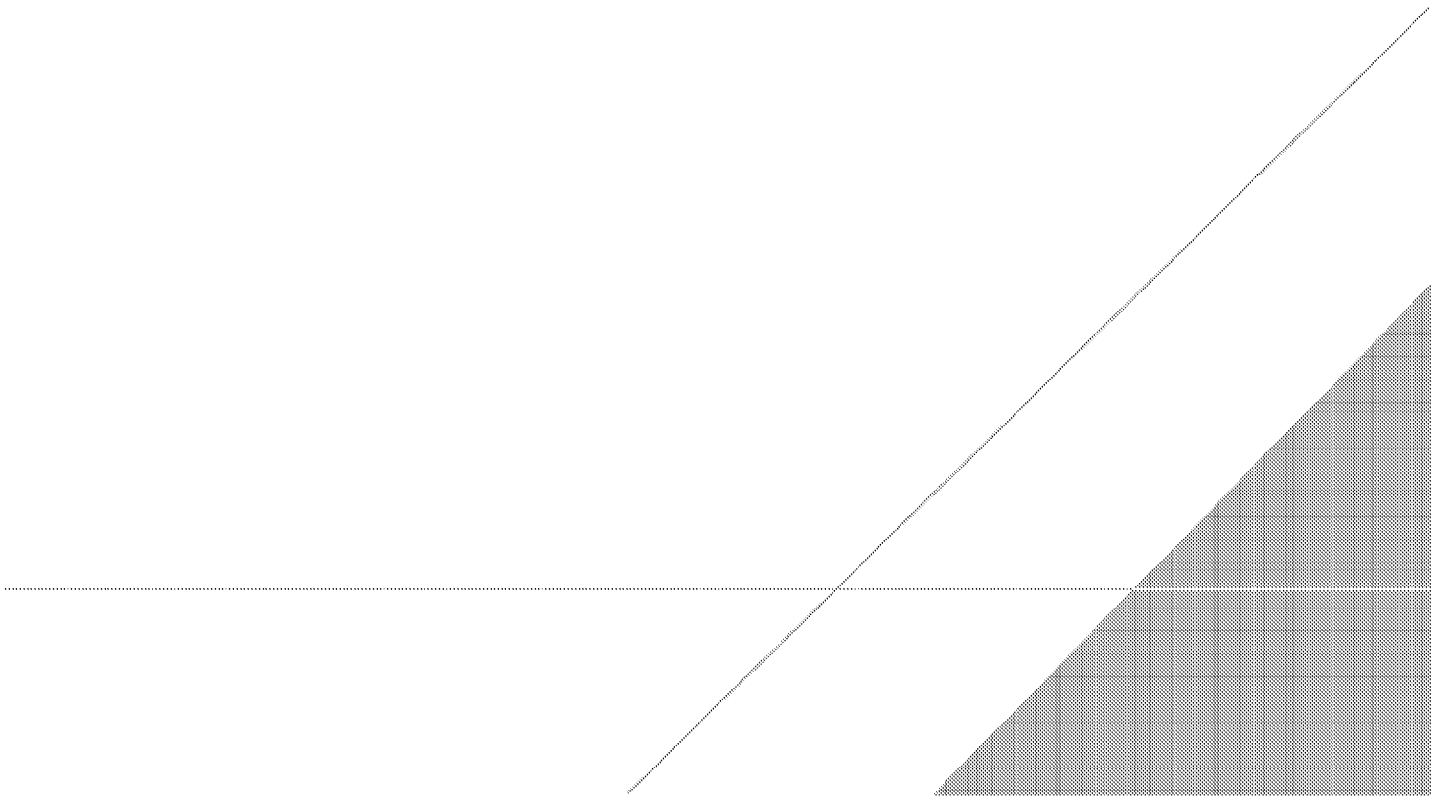
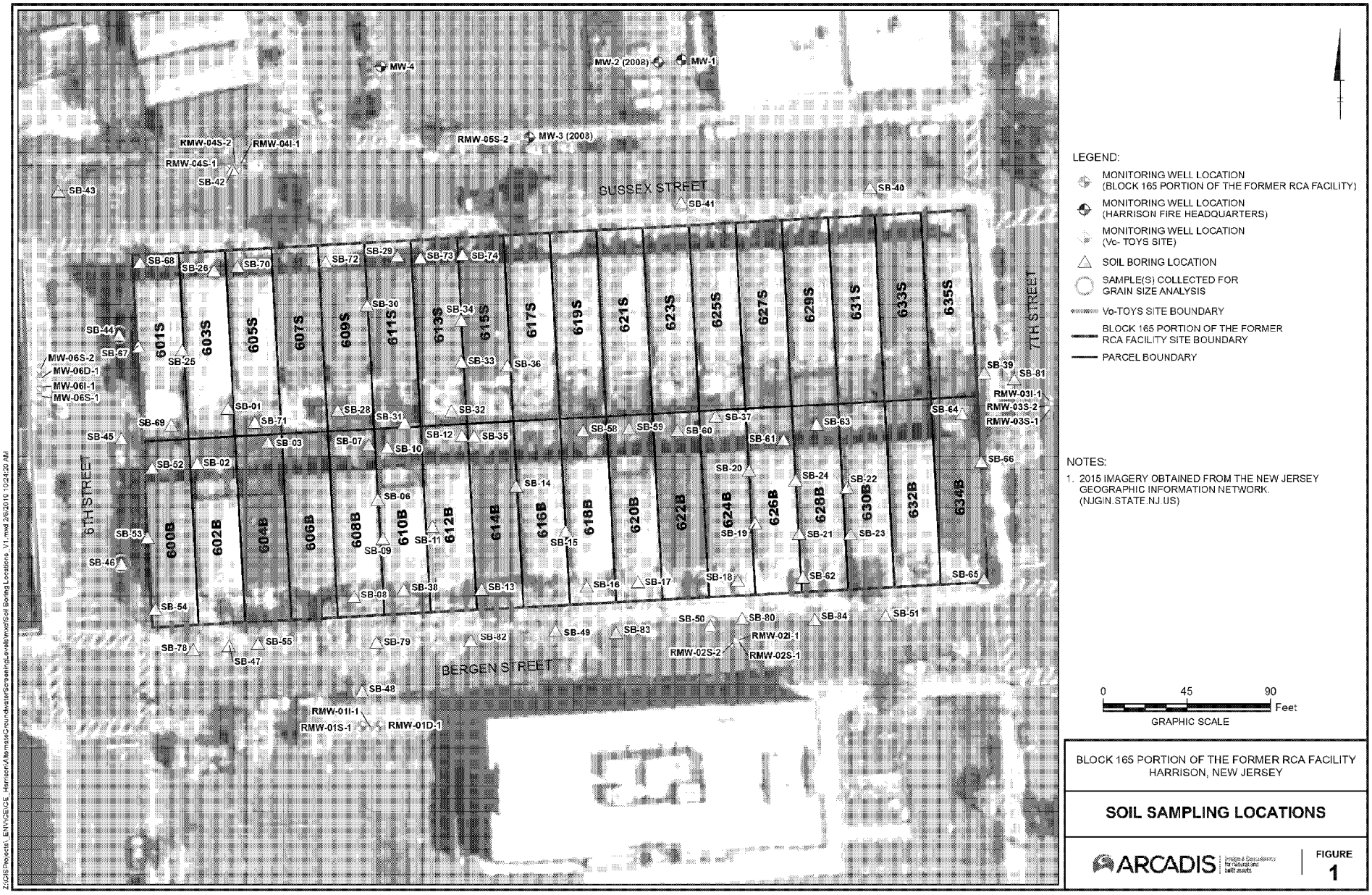
Figures





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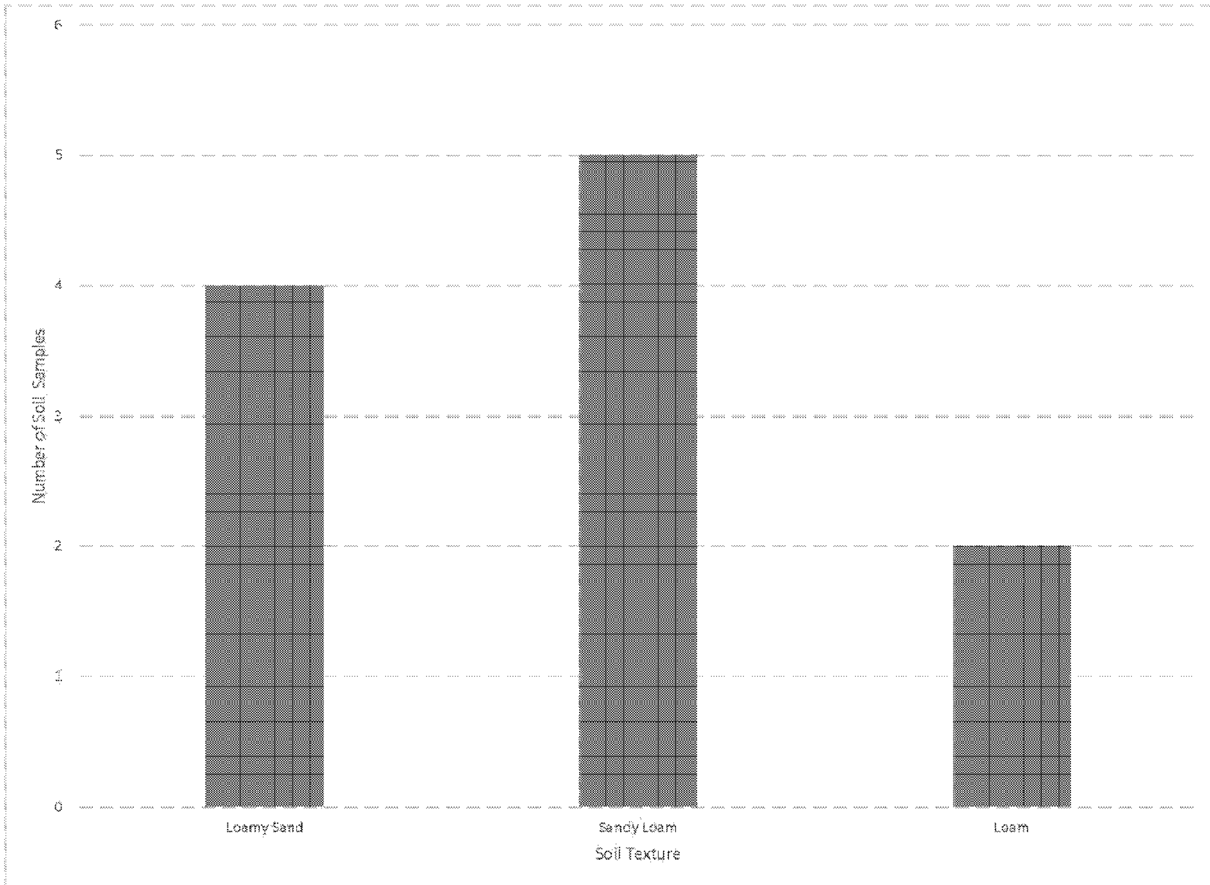

NOTES:

1. SOIL TEXTURES IDENTIFIED USING LABORATORY RESULTS OF INDIVIDUAL SOIL SAMPLES AND THE UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) SOIL TEXTURE CALCULATOR (https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_054167).

BLOCK 165 PORTION OF THE FORMER RCA FACILITY
HARRISON, NEW JERSEY

DISTRIBUTION OF SOIL TEXTURES

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FIGURE
2

Tables

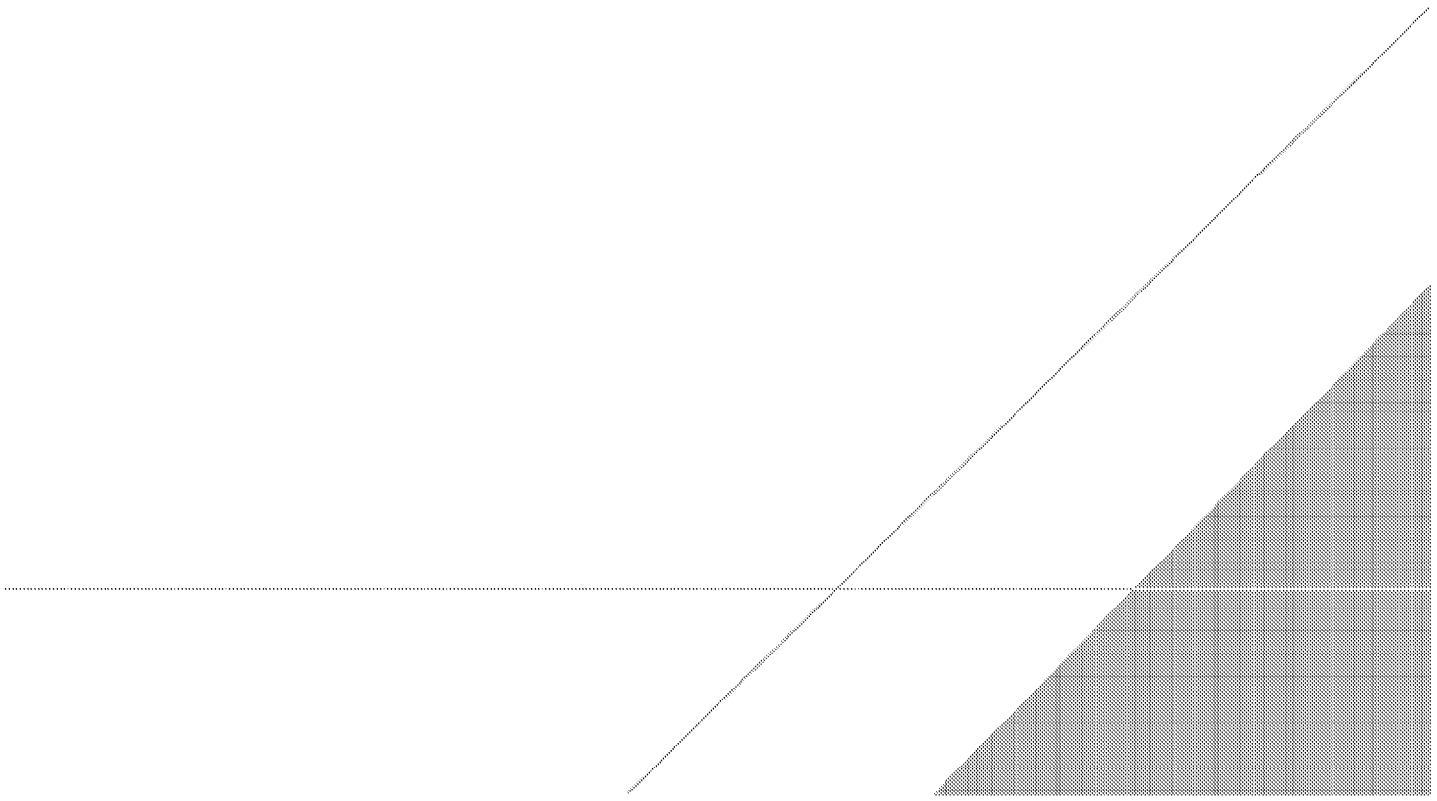

Table 1
Soil Texture Data Summary
Development of Alternative Groundwater Screening Levels
Block 165 Portion of the Former RCA Facility
Harrison, New Jersey

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	Results from Lab Report[1]						Conversion to USDA SCS Sieve Sizes[2]				USDA SCS Percentages[3]				Normalized USDA SCS Percentages[4]			
Sample ID	% > 2 mm	% passing 2 mm	% passing 0.075 mm	% passing 0.035 mm	% passing 0.0032 mm	% passing 0.0014 mm	% > 2 mm (gravel)	% passing 2 mm (sand or finer)	% passing 0.05 mm (silt or finer)	% passing 0.002 mm (clay)	% gravel	% sand	% silt	% clay	% sand	% silt	% clay	USDA SCS Soil Type[5]
SB-41(2-5)	51.3	48.7	20.6	17.1	7.6	5.7	51.3	48.7	18.4	6.3	51.3	30.3	12.1	6.3	62.2	24.8	13.0	Sandy Loam
SB-41(12.5-15)	2.8	97.2	42.1	19.4	4.2	2.5	2.8	97.2	27.9	3.1	2.8	69.3	24.8	3.1	71.3	25.6	3.2	Sandy Loam
SB-41(20-22.5)	9.7	90.3	28.8	14.6	4.9	4	9.7	90.3	19.9	4.3	9.7	70.4	15.6	4.3	77.9	17.3	4.8	Loamy Sand
SB-42(3-5.5)	16.4	83.6	48.1	38.2	14.1	10.9	16.4	83.6	41.9	12.0	16.4	41.7	29.9	12.0	49.9	35.8	14.3	Loam
SB-44(4-6.5)	40.2	59.8	29.3	17.1	5.5	4.4	40.2	59.8	21.7	4.8	40.2	38.1	16.9	4.8	63.8	28.3	8.0	Sandy Loam
SB-44(12-14.5)	5.7	94.3	62.2	48.2	14.1	11.6	5.7	94.3	53.5	12.4	5.7	40.9	41.0	12.4	43.3	43.5	13.2	Loam
SB-44(17.5-20)	0	100	37.3	11.1	6	6	0	100	20.9	6.0	0	79.1	14.9	6.0	79.1	14.9	6.0	Loamy Sand
SB-46(5-7.5)	2.9	97.1	52.2	36	9.2	8.4	2.9	97.1	42.1	8.7	2.9	55.0	33.4	8.7	56.7	34.4	8.9	Sandy Loam
SB-46(12.5-15)	1.1	98.9	22.4	18.3	9.6	7.8	1.1	98.9	19.8	8.4	1.1	79.1	11.4	8.4	79.9	11.6	8.5	Loamy Sand
SB-48(7.5-10)	1.6	98.4	19.4	13	4.3	3.5	1.6	98.4	15.4	3.8	1.6	83.0	11.6	3.8	84.3	11.8	3.8	Loamy Sand
SB-50(2.5-5)	19.2	80.8	33.3	28.1	10.3	8.9	19.2	80.8	30.1	9.4	19.2	50.8	20.7	9.4	62.8	25.6	11.6	Sandy Loam
Median	**5.7**	**94.3**	**33.3**	**18.3**	**7.6**	**6.0**	**5.7**	**94.3**	**21.7**	**6.3**	**5.7**	**55.0**	**16.9**	**6.3**	**63.8**	**25.6**	**8.5**	**Sandy Loam**

Notes:

1. Soil samples were analyzed for grain size by sieve analysis and by hydrometer via American Society for Testing and Materials (ASTM) Method D422 (2007).
2. The laboratory-reported grain size data were used to extrapolate the fraction of each sample that is finer than 0.05 millimeters (mm) and 0.002 mm by using linear interpolation between adjacent sieve sizes as follows:

$$\%\ \text{passing}\ 0.05\ \text{mm} = \%\ \text{passing}\ 0.075\ \text{mm} - \left(\frac{\%\ \text{passing}\ 0.075\ \text{mm} - \%\ \text{passing}\ 0.035\ \text{mm}}{0.075\ \text{mm} - 0.035\ \text{mm}}\right) \times (0.075\ \text{mm} - 0.05\ \text{mm})$$

$$\%\ \text{passing}\ 0.002\ \text{mm} = \%\ \text{passing}\ 0.0032\ \text{mm} - \left(\frac{\%\ \text{passing}\ 0.0032\ \text{mm} - \%\ \text{passing}\ 0.0014\ \text{mm}}{0.0032\ \text{mm} - 0.0014\ \text{mm}}\right) \times (0.0032\ \text{mm} - 0.002\ \text{mm})$$

3. United States Department of Agriculture (USDA) defines the following fractions: gravel (percentage greater than 2 mm), sand (percentage passing 2 mm, but not 0.05 mm), silt (percentage passing 0.05 mm, but not 0.002 mm), and clay (percentage passing 0.002 mm).
4. USDA uses the relative percentages of sand, silt, and clay to classify soil texture. Therefore, the converted percentages of these three fractions were normalized to the total of these three fractions.
5. Normalized USDA percentages were used to identify soil texture using the USDA Soil Texture Calculator (https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_054167).
6. Abbreviations are as follows:

% = percent
mm = millimeter
SCS = Soil Classification System
USDA = United States Department of Agriculture
ASTM = American Society for Testing and Materials
NJDEP = New Jersey Department of Environmental Protection

Table 2
Depth to Water Summary
Development of Alternative Groundwater Screening Levels
Block 165 Portion of the Former RCA Facility
Harrison, New Jersey

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	RMW-01S-1				RMW-02S-1				RMW-03S-1				RMW-04S-2			
Date	Depth to Water (feet BTOC)	TOC Elevation (feet amsl)	Ground Surface Elevation (feet amsl)	Depth to Water (feet bgs)	Depth to Water (feet BTOC)	TOC Elevation (feet amsl)	Ground Surface Elevation (feet amsl)	Depth to Water (feet bgs)	Depth to Water (feet BTOC)	TOC Elevation (feet amsl)	Ground Surface Elevation (feet amsl)	Depth to Water (feet bgs)	Depth to Water (feet BTOC)	TOC Elevation (feet amsl)	Ground Surface Elevation (feet amsl)	Depth to Water (feet bgs)
6/29/2017	--*	21.45	21.78	--*	Not Installed				Not Installed				Not Installed			
9/8/2017	19.07	21.45	21.78	19.40												
3/26/2018	18.72	21.45	21.78	19.05	16.32	19.10	19.40	16.62	14.14	17.00	17.34	14.48	25.72	28.67	29.12	26.17
6/15/2018	18.75	21.45	21.78	19.08	16.09	19.10	19.40	16.39	14.15	17.00	17.34	14.49	25.82	28.67	29.12	26.27
6/29/2018	18.90	21.45	21.78	19.23	16.47	19.10	19.40	16.77	14.32	17.00	17.34	14.66	25.95	28.67	29.12	26.40
7/13/2018	19.10	21.45	21.78	19.43	18.70	19.10	19.40	19.00	14.59	17.00	17.34	14.93	26.17	28.67	29.12	26.62
7/27/2018	19.13	21.45	21.78	19.46	16.70	19.10	19.40	17.00	14.52	17.00	17.34	14.86	26.14	28.67	29.12	26.59
8/10/2018	19.49	21.45	21.78	19.82	17.73	19.10	19.40	18.03	14.95	17.00	17.34	15.29	26.52	28.67	29.12	26.97
9/26/2018	18.65	21.45	21.78	18.98	16.22	19.10	19.40	16.52	14.07	17.00	17.34	14.41	25.72	28.67	29.12	26.17
12/11/2018	18.02	21.45	21.78	18.35	15.60	19.10	19.40	15.90	13.39	17.00	17.34	13.73	25.10	28.67	29.12	25.55
Average	--			**19.20**	--			**17.03**	--			**14.61**	--			**26.34**

Notes:

1. Abbreviations are as follows:
   BTOC = below top of casing
   amsl = above mean sea level
   TOC = top of casing
   bgs = below ground surface
   NM = not measured
   -- = not available
   * = June 2017 depth to water excluded. Measurement was obtained after the start of purging.
   ^ = Obtained from John Wood Group, PLC (formerly Amec Foster Wheeler). Form B or survey info unavailable.

Table 2
Depth to Water Summary
Development of Alternative Groundwater Screening Levels
Block 165 Portion of the Former RCA Facility
Harrison, New Jersey

ARCADIS

	MW-3 (2008)				MW-04S-1				MW-06S-1			
Date	Depth to Water (feet BTOC)	TOC Elevation (feet amsl) ^	Ground Surface Elevation (feet amsl) ^	Depth to Water (feet bgs)	Depth to Water (feet BTOC)	TOC Elevation (feet amsl)	Ground Surface Elevation (feet amsl)	Depth to Water (feet bgs)	Depth to Water (feet BTOC)	TOC Elevation (feet amsl)	Ground Surface Elevation (feet amsl)	Depth to Water (feet bgs)
6/29/2017	22.70	25.62	26.07	23.15	NM	24.32	24.50	NM	24.65	27.68	27.70	24.67
9/8/2017	23.21	25.62	26.07	23.66	21.90	24.32	24.50	22.08	25.15	27.68	27.70	25.17
3/26/2018	22.90	25.62	26.07	23.35	21.55	24.32	24.50	21.73	24.75	27.68	27.70	24.77
6/15/2018	NM	25.62	26.07	NM	NM	24.32	24.50	NM	24.84	27.68	27.70	24.86
6/29/2018	23.05	25.62	26.07	23.50	21.84	24.32	24.50	22.02	25.00	27.68	27.70	25.02
7/13/2018	23.22	25.62	26.07	23.67	22.02	24.32	24.50	22.20	25.20	27.68	27.70	25.22
7/27/2018	23.78	25.62	26.07	24.23	22.02	24.32	24.50	22.20	25.19	27.68	27.70	25.21
8/10/2018	24.21	25.62	26.07	24.66	21.81	24.32	24.50	21.99	25.49	27.68	27.70	25.51
9/26/2018	22.72	25.62	26.07	23.17	21.52	24.32	24.50	21.70	24.75	27.68	27.70	24.77
12/11/2018	22.18	25.62	26.07	22.63	20.88	24.32	24.50	21.06	24.20	27.68	27.70	24.22
Average	--			**23.56**		--		**21.87**		--		**24.94**

Notes:
1. Abbreviations are as follows:
BTOC = below top of casing
amsl = above mean sea level
TOC = top of casing
bgs = below ground surface
NM = not measured
-- = not available
* = June 2017 depth to water excluded. Measurement was obtained after the start of purging.
^ = Obtained from John Wood Group, PLC (formerly Amec Foster Wheeler). Form B or survey info unavailable.

Table 3
Johnson and Ettinger Model Input Parameters
Development of Alternative Groundwater Screening Levels
Block 165 Portion of the Former RCA Facility
Harrison, New Jersey

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Parameter	Symbol	Units	Sandy Loam Scenario	
			Value	Rationale
Parameters				
Depth Below Grade to Water Table	L_{WT}	cm	445	Site-specific value [1]
Thickness of Soil Stratum A	h_A	cm	445	Site-specific value [1]
Environmental Parameters				
Average Soil/Groundwater Temperature	T_S	°C	13	NJDEP 2013, 2016 [2]
Soil Stratum A SCS Soil Type	--	--	Sandy Loam	Site-specific value [3]
Stratum A Soil Dry Bulk Density	ρ_b^A	g/cm^3	1.62	NJDEP 2013, 2016 [2]
Stratum A Soil Total Porosity	nA	unitless	0.387	NJDEP 2013, 2016 [2]
Stratum A Soil Water-Filled Porosity	θ_w^A	cm^3/cm^3	0.103	NJDEP 2013, 2016 [2]
Building Parameters				
Enclosed Space Floor Thickness	L_{crack}	cm	10	NJDEP 2013, 2016 [2]
Depth Below Grade to Bottom of Enclosed Space Floor	L_F	cm	200	NJDEP 2013, 2016 [2]
Soil-Building Pressure Differential	ΔP	g/cm-s^2	--	USEPA 2017 [4]
Enclosed Space Floor Length	L_B	cm	1,000	NJDEP 2013, 2016 [2]
Enclose Space Floor Width	W_B	cm	1,000	NJDEP 2013, 2016 [2]
Enclosed Space Height	H_B	cm	366	NJDEP 2013, 2016 [2]
Floor-Wall Seam Crack Width	w	cm	--	USEPA 2017 [5]
Crack-to-Total Ratio	η	unitless	0.001	USEPA 2017 [5]
Indoor Air Exchange Rate	ER	hr^{-1}	0.45	USEPA 2017 [6]
Average Vapor Flow Rate into Building	Q_{soil}	L/m	8.22	USEPA 2017 [5]
Receptor Exposure Parameters				
Averaging Time for Carcinogens	AT_C	years	70	NJDEP 2013, 2016 [2]
Averaging Time for Noncarcinogens	AT_{NC}	years	30	NJDEP 2013, 2016 [2]
Exposure Duration	ED	years	30	NJDEP 2013, 2016 [2]
Exposure Frequency	EF	days/year	350	NJDEP 2013, 2016 [2]
Target Risk for Carcinogens	TR	unitless	1E-06	NJDEP 2013, 2016 [2]
Target Hazard Quotient for Noncarcinogens	THQ	unitless	1	NJDEP 2013, 2016 [2]

Notes:

1. Depth below grade to water table was estimated as the shallowest average depth to water in monitoring wells RMW-01S-1, RMW-02S-1, RMW-03S-1, RMW-04S-2, MW-3 (2008), MW-04S-1, and MW-06S-1 based on water level measurements collected in 2017 and 2018.
2. New Jersey Department of Environmental Protection (NJDEP) value obtained from Update to the New Jersey Department of Environmental Protection (NJDEP) Vapor Intrusion Screening Levels (2013) and Instructions for the New Jersey Johnson & Ettinger (J&E) Spreadsheets NJ-GW-SCREEN and NJ-GW-ADV (September 2016).
3. United States Department of Agriculture (USDA) soil textures were identified using the USDA Soil Texture Calculator, available from https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_054167.
4. The United States Environmental Protection Agency (USEPA 2017) recommends calculating the average vapor flow rate into a building (Q_{soil}) by multiplying the building ventilation rate ($Q_{building}$) by the default Q_{soil}: $Q_{building}$ ratio of 0.003. This calculation overrides the use of input parameter soil-building pressure differential (ΔP).
5. USEPA (2017) recommends the use of a crack-to-total ratio (η) of 0.001. This calculation overrides the use of input parameter floor-wall seam crack width.
6. USEPA (2017) recommends the use of a indoor air exchange rate of 0.45 for residential buildings.
7. Abbreviations are as follows:

NJDEP = New Jersey Department of Environmental Protection
USEPA = United States Environmental Protection Agency
cm = centimeters
°C = degrees Celsius
-- = not applicable
g/cm^3 = grams per cubic centimeter
cm^3/cm^3 = cubic centimeter per cubic centimeter
g/cm^2-s = grams per square centimeter - second
cm^2 = square centimeter
m = meter
hr^{-1} = 1/hour
L/m = liters per minute

Table 4
Physico-chemical Parameters and Toxicity Values
Development of Alternative Groundwater Screening Levels
Block 168 Portion of the Former RCA Facility
Harrison, New Jersey

ARCADIS Design & Consultancy for natural and built assets

Analyte	Organic Carbon Partition Coefficient K_{oc} (cm^3/g)	Diffusivity in Air D_a (cm^2/s)	Diffusivity in Water D_w (cm^2/s)	Pure Component Water Solubility S (mg/L)	Henry's Law Constant H' (unitless)	Henry's Law Constant at Reference Temperature H (atm-m^3/mol)	Henry's Law Constant Reference Temperature T_R (°C)	Normal Boiling Point T_B (K)	Critical Temperature T_C (K)	Enthalpy of Vaporization at the Normal Boiling Point DH_{vb} (cal/mol)	Unit Risk Factor URF ($\mu g/m^3)^{-1}$	Reference Concentration RfC (mg/m^3)
Acetone	2.36E+00	1.06E-01	1.15E-05	1.00E+06	1.43E-03	3.50E-05	25	3.29E+02	5.08E+02	6.96E+03	--	3.1E+01
Benzene	1.46E+02	8.95E-02	1.03E-05	1.79E+03	2.27E-01	5.55E-03	25	3.53E+02	5.62E+02	7.34E+03	7.8E-06	3.0E-02
Bromodichloromethane	3.18E+01	5.63E-02	1.07E-05	3.03E+03	8.67E-02	2.12E-03	25	3.63E+02	5.86E+02	7.80E+03	3.7E-05	--
Bromoform	3.18E+01	3.57E-02	1.04E-05	3.10E+03	2.19E-02	5.35E-04	25	4.22E+02	6.96E+02	9.48E+03	1.1E-06	--
Bromomethane	1.32E+01	1.00E-01	1.35E-05	1.52E+04	3.00E-01	7.34E-03	25	2.77E+02	4.67E+02	5.71E+03	--	5.0E-03
2-Butanone (methyl ethyl ketone)	4.51E+00	9.14E-02	1.02E-05	2.23E+05	2.33E-03	5.69E-05	25	3.53E+02	5.37E+02	7.48E+03	--	5.0E+00
Carbon disulfide	2.17E+01	1.06E-01	1.30E-05	2.16E+03	5.89E-01	1.44E-02	25	3.19E+02	5.53E+02	6.39E+03	--	7.0E-01
Carbon tetrachloride	4.39E+01	5.71E-02	9.78E-06	7.93E+02	1.13E+00	2.76E-02	25	3.50E+02	5.56E+02	7.13E+03	6.0E-06	1.0E-01
Chlorobenzene	2.34E+02	7.21E-02	9.48E-06	4.98E+02	1.27E-01	3.11E-03	25	4.05E+02	6.32E+02	8.41E+03	--	5.0E-02
Chloroethane	2.17E+01	1.04E-01	1.16E-05	6.71E+03	4.54E-01	1.11E-02	25	2.85E+02	4.60E+02	5.88E+03	--	1.0E+01
Chloroform	3.18E+01	7.89E-02	1.09E-05	7.95E+03	1.50E-01	3.67E-03	25	3.34E+02	5.36E+02	6.99E+03	2.3E-05	9.8E-02
Chloromethane	1.32E+01	1.24E-01	1.36E-05	5.32E+03	3.61E-01	8.82E-03	25	2.49E+02	4.16E+02	5.11E+03	--	9.0E-02
Cyclohexane	1.46E+02	8.00E-02	9.11E-06	5.50E+01	6.13E+00	1.50E-01	25	3.54E+02	5.54E+02	7.16E+03	--	6.0E+00
Dibromochloromethane	3.18E+01	3.96E-02	1.06E-05	2.70E+03	3.20E-02	7.83E-04	25	3.93E+02	6.78E+02	9.90E+03	--	--
1,2-Dibromoethane	3.96E+01	4.30E-02	1.04E-05	3.91E+03	2.66E-02	6.50E-04	25	4.05E+02	5.83E+02	8.31E+03	6.0E-04	9.0E-03
1,2-Dichlorobenzene	3.63E+02	5.62E-02	8.92E-06	1.56E+02	7.85E-02	1.92E-03	25	4.53E+02	6.90E+02	9.70E+03	--	2.0E-01
1,4-Dichlorobenzene	3.75E+02	5.50E-02	8.68E-06	8.13E+01	9.85E-02	2.41E-03	25	4.47E+02	6.81E+02	9.27E+03	1.1E-05	8.0E-01
Dichlorodifluoromethane	4.39E+01	7.60E-02	1.08E-05	2.80E+02	1.40E+01	3.43E-01	25	2.43E+02	3.85E+02	9.42E+03	--	1.0E-01
1,1-Dichloroethane	3.18E+01	8.36E-02	1.06E-05	5.04E+03	2.30E-01	5.62E-03	25	3.31E+02	5.35E+02	6.90E+03	1.6E-06	--
1,2-Dichloroethane	3.96E+01	8.57E-02	1.10E-05	8.60E+03	4.82E-02	1.18E-03	25	3.57E+02	5.63E+02	7.64E+03	2.6E-05	7.0E-03
1,1-Dichloroethene	3.18E+01	8.83E-02	1.10E-05	2.42E+03	1.07E+00	2.61E-02	25	3.05E+02	4.94E+02	6.25E+03	--	2.0E-01
1,2-Dichloropropane	6.07E+01	7.33E-02	9.73E-06	2.80E+03	1.15E-01	2.82E-03	25	3.69E+02	5.72E+02	7.59E+03	3.7E-06	4.0E-03
1,3-Dichloropropene	7.22E+01	7.83E-02	1.01E-05	2.80E+03	1.45E-01	3.55E-03	25	3.85E+02	5.87E+02	7.90E+03	4.0E-06	3.7E-06
Ethylbenzene	4.46E+02	6.85E-02	8.46E-06	1.69E+02	3.22E-01	7.88E-03	25	4.09E+02	6.17E+02	8.50E+03	2.5E-06	1.0E+00
Freon 113	1.97E+02	3.76E-02	8.59E-06	1.70E+02	2.15E+01	5.26E-01	25	3.21E+02	4.87E+02	6.46E+03	--	5.0E+00
Methyl Tert Butyl Ether	1.16E+01	7.53E-02	8.59E-06	5.10E+04	2.40E-02	5.87E-04	25	3.29E+02	4.97E+02	6.68E+03	2.6E-07	3.0E+00
4-Methyl-2-pentanone (methyl isobutyl ketone)	1.26E+01	6.98E-02	8.35E-06	1.90E+04	5.64E-03	1.38E-04	25	3.90E+02	5.75E+02	8.24E+03	--	3.0E+00
Methylene chloride	2.17E+01	9.99E-02	1.25E-05	1.30E+04	1.33E-01	3.25E-03	25	3.13E+02	5.10E+02	6.71E+03	1.0E-08	6.0E-01
Styrene	4.46E+02	7.11E-02	8.78E-06	3.10E+02	1.12E-01	2.75E-03	25	4.18E+02	6.37E+02	8.74E+03	--	1.0E+00
1,1,2,2-Tetrachloroethane	9.49E+01	4.89E-02	9.29E-06	2.83E+03	1.50E-02	3.67E-04	25	4.20E+02	6.61E+02	9.00E+03	5.8E-05	--
Tetrachloroethene	9.49E+01	5.55E-02	9.46E-06	2.06E+02	7.24E-01	1.77E-02	25	3.94E+02	6.20E+02	8.29E+03	2.6E-07	4.0E-02
Toluene	2.34E+02	7.78E-02	9.20E-06	5.26E+02	2.71E-01	6.64E-03	25	3.84E+02	5.92E+02	7.93E+03	--	5.0E+00
1,2,4-Trichlorobenzene	1.36E+03	3.96E-02	8.40E-06	4.90E+01	5.81E-02	1.42E-03	25	4.87E+02	7.26E+02	1.05E+04	--	2.0E-03
1,1,1-Trichloroethane	4.39E+01	6.48E-02	9.60E-06	1.29E+03	7.03E-01	1.72E-02	25	3.47E+02	5.85E+02	7.14E+03	--	5.0E+00
1,1,2-Trichloroethane	6.07E+01	6.89E-02	1.00E-05	4.59E+03	3.37E-02	8.24E-04	25	3.87E+02	6.02E+02	8.32E+03	1.6E-05	2.0E-04
Trichloroethene	6.07E+01	6.87E-02	1.02E-05	1.28E+03	4.03E-01	9.85E-03	25	3.60E+02	5.73E+02	7.51E+03	4.1E-06	2.0E-03
Trichlorofluoromethane	4.39E+01	6.54E-02	1.00E-05	1.10E+03	3.97E+00	9.70E-02	25	2.97E+02	4.71E+02	6.00E+03	--	--
Vinyl chloride	2.17E+01	1.07E-01	1.20E-05	8.80E+03	1.14E+00	2.78E-02	25	2.60E+02	4.25E+02	5.25E+03	4.4E-06	1.0E-01
Xylene (total)	3.63E+02	8.47E-02	9.90E-06	1.06E+02	2.12E-01	5.18E-03	25	4.12E+02	6.21E+02	8.57E+03	--	1.0E-01

Notes:

1. Chemical specific physico-chemical parameters were obtained from the New Jersey Department of Environmental Protection spreadsheet versions of the Johnson and Ettinger (J&E) Models available from: http://www.nj.gov/dep/srp/guidance/vaporintrusion/njje.htm.
2. Toxicity values were obtained from the United States Environmental Protection Agency (USEPA) hierarchy of sources in order of priority as described in the USEPA Regional Screening Levels User's Guide (USEPA 2018) and Memorandum regarding Human Health Toxicity Values in Superfund Risk Assessments (USEPA 2003).
3. Abbreviations are as follows:

cm^3/g = cubic centimeters per gram
cm^2/s = square centimeters per second
mg/L = milligrams per liter
atm-m^3/mol = atmospheres - cubic meters per mole
°C = degrees Celsius
K = Kelvin
cal/mol = calories per mole
$(\mu g/m^3)^{-1}$ = per micrograms per cubic meter
mg/m^3 = milligrams per cubic meter
-- = not available

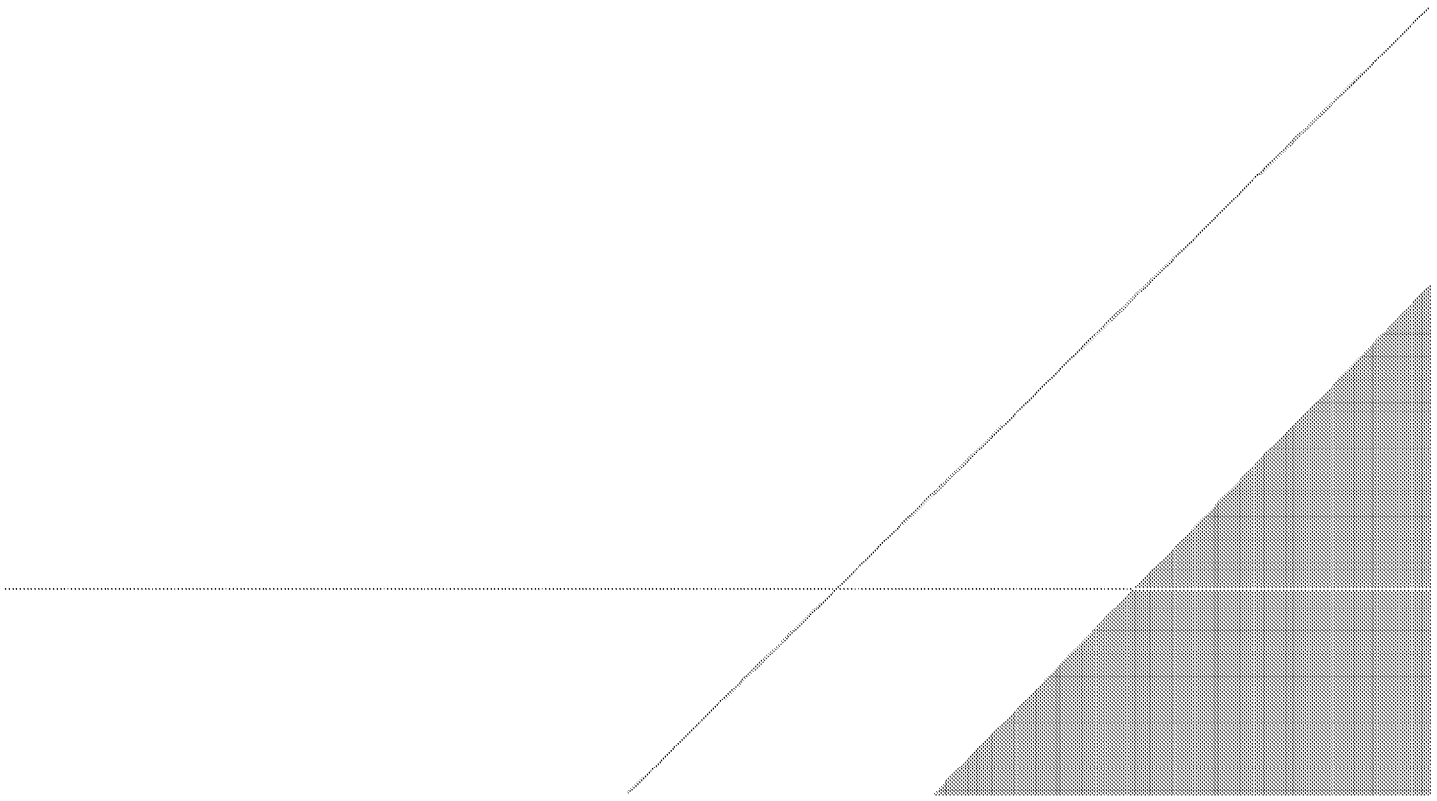
Table 5
Alternative Groundwater Screening Levels
Development of Alternative Groundwater Screening Levels
Block 165 Portion of the Former RCA Facility
Harrison, New Jersey

Analyte	Units	Health Based Ground Water to Indoor Air Value[1]	NJDEP GWQS[2]	Alternative Ground Water Screening Level[3]
Acetone	µg/L	43,000,000	6,000	43,000,000
Benzene	µg/L	190	1	190
Bromodichloromethane	µg/L	12	1	12
Bromoform	µg/L	1,100	4	1,100
Bromomethane	µg/L	190	10	190
2-Butanone (methyl ethyl ketone)	µg/L	5,700,000	300	5,700,000
Carbon disulfide	µg/L	15,000	700	15,000
Carbon tetrachloride	µg/L	8	1	8
Chlorobenzene	µg/L	7,000	50	7,000
Chloroethane	µg/L	260,000	--	260,000
Chloroform	µg/L	10	70	70
Chloromethane	µg/L	2,300	--	2,300
Cyclohexane	µg/L	180,000	--	180,000
Dibromochloromethane	µg/L	--	0.4	--
1,2-Dibromoethane	µg/L	2	0.03	2
1,2-Dichlorobenzene	µg/L	52,000	600	52,000
1,4-Dichlorobenzene	µg/L	47	75	75
Dichlorodifluoromethane	µg/L	140	1,000	1,000
1,1-Dichloroethane	µg/L	95	50	95
1,2-Dichloroethane	µg/L	20	2	20
1,1-Dichloroethene	µg/L	2,800	1	2,800
1,2-Dichloropropane	µg/L	88	1	88
cis-1,3-Dichloropropene	µg/L	--	0.4	--
trans-1,3-Dichloropropene	µg/L	--	0.4	--
1,3-Dichloropropene	µg/L	67	1	67
Ethylbenzene	µg/L	650	700	700
Freon 113	µg/L	8,400	20,000	20,000
Methyl Tert Butyl Ether	µg/L	3,300	70	3,300
4-Methyl-2-pentanone (methyl isobutyl ketone)	µg/L	2,600,000	--	2,600,000
Methylene chloride	µg/L	8,000	3	8,000
Styrene	µg/L	1,600,000	100	1,600,000
1,1,2,2-Tetrachloroethane	µg/L	24	1	24
Tetrachloroethene	µg/L	370	1	370
Toluene	µg/L	3,400,000	600	3,400,000
1,2,4-Trichlorobenzene	µg/L	800	9	800
1,1,1-Trichloroethane	µg/L	150,000	30	150,000
1,1,2-Trichloroethane	µg/L	49	3	49
Trichloroethene	µg/L	20	1	20
Trichlorofluoromethane	µg/L	--	2,000	--
Vinyl chloride	µg/L	1	1	1
Xylene (total)	µg/L	83,000	1,000	83,000

Notes:

1. Consistent with NJDEP procedures (NJDEP 2013, 2016), the Health Based Groundwater to Indoor Air Values were adjusted for potential mutagenicity, a factor of 10 was applied for degradation, and rounded in accordance with Hurlburt (1994).
2. NJDEP Ground Water Quality Standards (GWQS) were obtained from New Jersey Administrative Code (N.J.A.C.) Title 7, Chapter 9C (http://www.nj.gov/dep/rules/rules/njac7_9c.pdf).
3. The Alternative Groundwater Screening Level (GWSL) corresponds to the higher of the NJDEP GWQS/Practical Quantitation Level (PQL) and the Health Based Ground Water to Indoor Air Value.
4. Abbreviations are as follows:
   µg/L = micrograms per liter
   -- = not available

ATTACHMENT 1

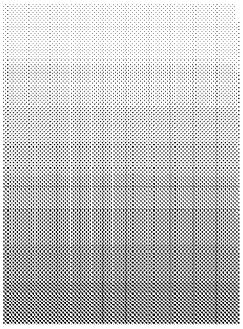


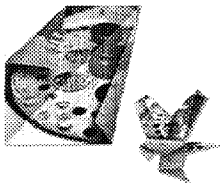
SGS ACCUTEST
New Jersey

12/08/17

SGS ACCUTEST IS PART OF SGS, THE WORLD'S LEADING INSPECTION, VERIFICATION, TESTING AND CERTIFICATION COMPANY.

e-Hardcopy 2.0
Automated Report





Technical Report for

Arcadis

GE-Harrison, Sixth Avenue and Sussex Street, Harrison, NJ

AP014013.1000.001S

SGS Accutest Job Number: JC46221XR

Sampling Dates: 05/23/17 - 06/02/17

Report to:

Arcadis U.S., Inc.
8 South River Road
Cranbury, NJ 08512
david.maza@arcadis.com

ATTN: David Maza

Total number of pages in report: 47

NELAP ACCREDITED TNI LABORATORY

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Nancy Cole
Laboratory Director

Client Service contact: Diane Komar 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, FL, IL, IN, KS, KY, LA, MA, MD, ME, MN, NC, OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TX, UT, VA, WV, DoD ELAP (L-A-B L2248)

Sections: 1 2 3

Table of Contents

-1-

Sample Summary

Arcadis

Job No: JC46221XR

GE-Harrison, Sixth Avenue and Sussex Street, Harrison, NJ
Project No: AP014013.1000.001S

Sample Number	Collected Date	Time	By	Received	Matrix Code	Matrix Type	Client Sample ID
JC46221-1XR	05/24/17	08:00	GB/JD	06/30/17	SO	Soil	SB-41 (2-5)
JC46221-2XR	05/24/17	08:20	GB/JD	06/30/17	SO	Soil	SB-41 (12.5-15)
JC46221-3XR	05/24/17	08:30	GB/JD	06/30/17	SO	Soil	SB-41 (20-22.5)
JC46221-4XR	05/23/17	08:00	GB/JD	06/30/17	SO	Soil	SB-42 (3-5.5)
JC46221-5XR	05/25/17	09:10	GB/JD	06/30/17	SO	Soil	SB-44 (4-6.5)
JC46221-6XR	05/25/17	09:15	GB/JD	06/30/17	SO	Soil	SB-44 (12-14.5)
JC46221-7XR	05/25/17	09:30	GB/JD	06/30/17	SO	Soil	SB-44 (17.5-20)
JC46221-9XR	05/30/17	15:00	GB/JD	06/30/17	SO	Soil	SB-48 (7.5-10)
JC46221-10XR	06/02/17	17:00	GB/JD	06/30/17	SO	Soil	SB-50 (2.5-5)
JC46221-11XR	05/25/17	13:40	GB/JD	06/30/17	SO	Soil	SB-46 (5-7.5)

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Subcontract Lab Data

Report of Analysis

SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SUMMARY OF SOIL DATA

Sample Identification		Sample Type	Soil Classification	Received Moisture %	Atterberg Limits				Grain Size Distribution			Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
Accutest ID	Field ID				L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm		Moisture %	Dry (lb/cuft)		
JC46221-1XR	SB-41 (2-5)	UD	SC-SM	7.8	23	19	4	-2.60	61.0	20.6	9.5	2.72	7.8	105.7	-	-
JC46221-2XR	SB-41 (12.5-15)	UD	SM	19.5	NP	NP	NP	NP	99.4	42.1	6.0	2.72	19.5	102.7	-	-
JC46221-3XR	SB-41 (20-22.5)	UD	SM	20.6	NP	NP	NP	NP	92.9	28.8	6.0	2.67	20.6	92.1	-	-
JC46221-4XR	SB-42 (3-5.5)	UD	SM	11.2	19	16	3	-1.66	90.9	48.1	19.0	2.60	11.2	128.8	-	-
JC46221-5XR	SB-44 (4-6.5)	UD	GC-GM	11.5	26	22	4	-3.06	64.2	29.3	8.0	2.77	11.5	83.8	-	-
JC46221-6XR	SB-44 (12-14.5)	UD	ML	16.9	17	16	1	0.83	96.5	62.2	17.0	2.65	16.9	118.4	-	-
JC46221-7XR	SB-44 (17.5-20)	UD	SM	15.6	NP	NP	NP	NP	100.0	37.3	6.4	2.71	15.6	113.5	-	-
JC46221-8XR	SB-46 (12.5-15)	UD	SM	4.2	NP	NP	NP	NP	100.0	22.4	10.4	2.65	4.2	91.2	-	-
JC46221-9XR	SB-48 (7.5-10)	UD	SM	11.9	NP	NP	NP	NP	99.2	19.4	4.3	2.67	11.9	121.2	-	-
JC46221-10XR	SB-50 (2.5-5)	UD	SM	11.7	18	15	3	-0.99	84.7	33.3	12.0	2.57	11.7	109.0	-	-
JC46221-11XR	SB-46 (5-7.5)	UD	ML	10.3	NP	NP	NP	NP	98.3	52.2	10.8	2.65	10.3	120.4	-	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

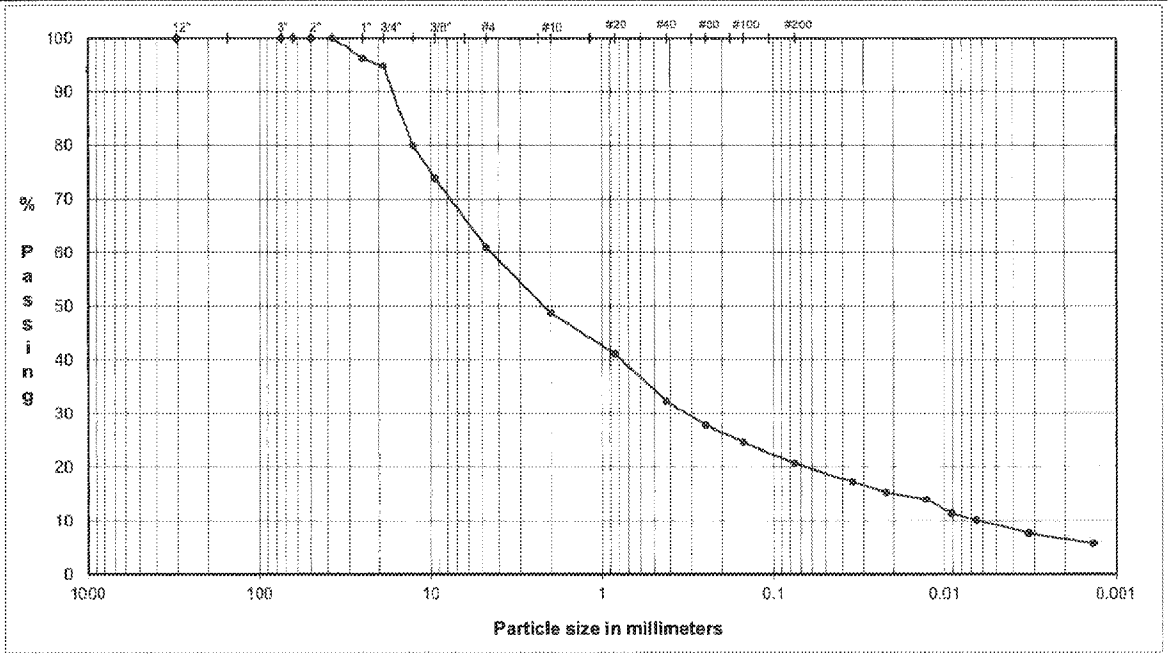
NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-1XR SB-41 (2-5)
TYPE: UD



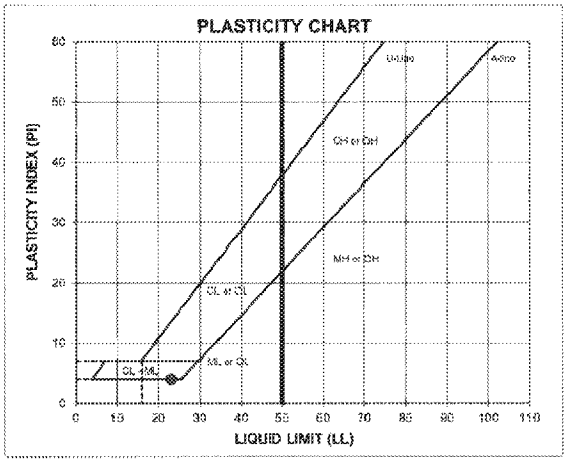
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	96.2		
0.75"	19.0	94.8	Coarse Gravel	5.2
0.50"	12.7	79.9		
0.375"	9.5	73.9		
#4	4.8	61.0	Fine Gravel	33.7
#10	2.00	48.7	Coarse Sand	12.3
#20	0.85	41.1		
#40	0.43	32.3	Medium Sand	16.4
#60	0.25	27.9		
#100	0.15	24.6		
#200	0.075	20.6	Fine Sand	11.7

Hydrometer Analysis

(mm)	%Finer		
0.035	17.1		
0.022	15.2		
0.013	14.0	Fines	
0.0092	11.4	Silt or Clay	20.6
0.0065	10.1		
0.0032	7.6		
0.0014	5.7		



ATTERBERG LIMITS
Method -B (Dry preparation)

M.	LL	PL	PI	LI
7.8	23	19	4	-2.60

LL (oven-dried) / LL (oven-dried) / LL (not dried)

DESCRIPTION: CLAYEY SAND to SILTY SAND and GRAVEL, fine to coarse sand, fine to coarse gravel; reddish brown.

USCS: SC-SM

NOTE: *Insufficient sample received to perform in accordance with ASTM Standards*

TECH	FT/SDM
DATE	10/25/17
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	SAMPLE ID	JC46221-1XR SB-41 (2-5)
		SAMPLE TYPE	UD
TESTED FOR	Gs	SAMPLE DEPTH	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	86.54
Weight Soil and Tare, Final (gm)	86.53
Weight Of Tare (gm)	52.09
Weight Of Moisture (gm)	0.01
Weight Of Dry Soil (gm)	34.44
Hygroscopic Moisture In (%)	0.0%

Test Method		Method - B
Pycnometer Number		15
Weight Pycnometer Empty (gm)		176.34
Volume of Pycnometer (gm)		499.59
Weight Pycnometer and Water (gm)		674.97
Mass of Pycnometer and Water at the test Temperture	(A)	674.82
Observed Temperature (Tb), for (Mb) In Degrees C		22.00
Weight of Soil, Water & Pycnometer (gm)	(B)	722.29
Temperature, C		22.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		74.98
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	74.98
Temperature Coefficient		0.9996

SPECIFIC GRAVITY (G) 2.724

$G @ 20^0 C = [C/(A-(B - C))]*(K)$

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

NOTE: Test conducted only on the minus No. 4 sieve material, insufficient material to test the plus No. 4 material (gravel).

TECH	TJ
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-1XR SB-41 (2-5)
TYPE: UD

WEIGHT OF SOIL (g)	277.09
LENGTH OF SAMPLE (in)	3.41
DIAMETER OF SAMPLE (in)	1.86
AREA OF SAMPLE (in^2)	2.72
VOLUME OF SAMPLE (in^3)	9.27
VOLUME OF SAMPLE (cm^3)	151.91

WET UNIT WEIGHT (pcf)	113.9

WEIGHT WET SOIL & TARE (g)	170.16
WEIGHT DRY SOIL & TARE (g)	161.59
WEIGHT OF TARE (g)	52.08
WEIGHT OF WATER (g)	8.57
WEIGHT OF DRY SOIL (g)	109.51
WATER CONTENT (%)	7.8

DRY UNIT WEIGHT (pcf)	105.7

REMARKS: Sample very loose and dry with coarse gravel.

TECH	SDM
DATE	10/25/17
CHECK	
REVIEW	
APPROVE	

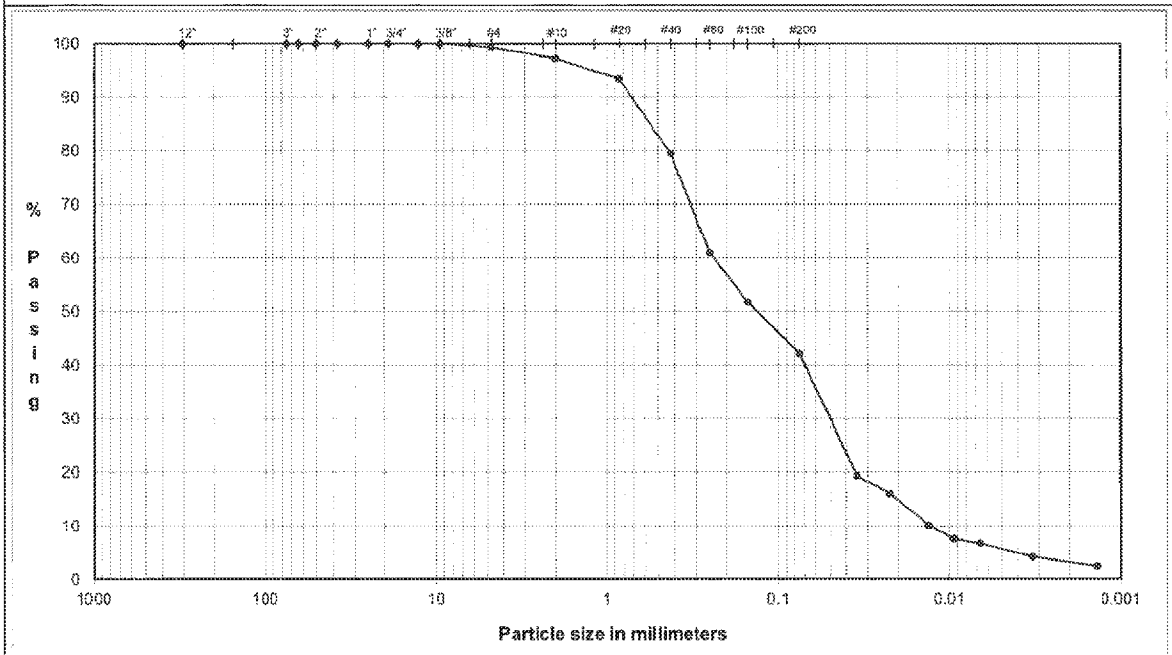
GOLDER ASSOCIATES INC.

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-2XR SB-41 (12.5-15)
TYPE: UD



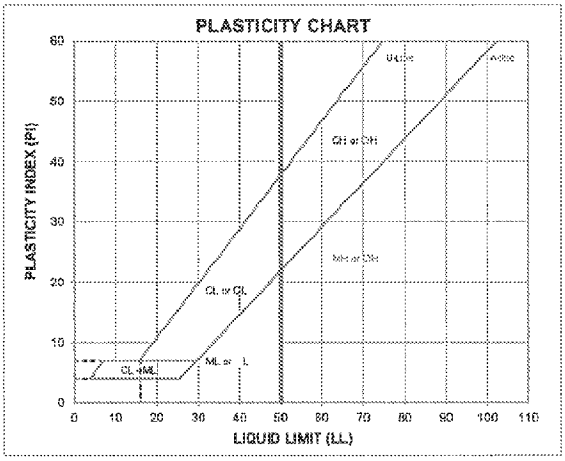
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	99.4	Fine Gravel	0.6
#10	2.00	97.2	Coarse Sand	2.1
#20	0.85	93.4		
#40	0.43	79.4	Medium Sand	17.8
#60	0.25	61.0		
#100	0.15	51.8		
#200	0.075	42.1	Fine Sand	37.3

Hydrometer Analysis

(mm)	%Finer		
0.035	19.4		
0.022	16.0		
0.013	10.1	Fines	
0.0094	7.6	Silt or Clay	42.1
0.0067	6.7		
0.0033	4.2		
0.0014	2.5		



ATTERBERG LIMITS
Method -B (Dry preparation)

M.	LL	PL	PI	LI
19.5	NP	NP	NP	NP

LL (oven-dried) / 0.75 ORGANIC (OL/OH)

DESCRIPTION: SAND and SILT, fine to coarse, trace fine gravel; strong brown.

USCS: SM

NOTE:

TECH	FT/RH
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	SAMPLE ID	JC46221-2XR SB-41 (12.5-15)
		SAMPLE TYPE	UD
TESTED FOR	Gs	SAMPLE DEPTH	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	104.47
Weight Soil and Tare, Final (gm)	104.27
Weight Of Tare (gm)	51.97
Weight Of Moisture (gm)	0.20
Weight Of Dry Soil (gm)	52.30
Hygroscopic Moisture In (%)	0.4%

Test Method		Method - B
Pycnometer Number		10
Weight Pycnometer Empty (gm)		178.66
Volume of Pycnometer (gm)		499.58
Weight Pycnometer and Water (gm)		677.27
Mass of Pycnometer and Water at the test Temperture	(A)	677.12
Observed Temperature (Tb), for (Mb) In Degrees C		22.00
Weight of Soil, Water & Pycnometer (gm)	(B)	724.57
Temperature, C		22.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		75.06
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	75.06
Temperature Coefficient		0.9996

SPECIFIC GRAVITY (G) 2.717

$G @ 20^{0} C = [C/(A-(B - C))]*(K)$

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	TJ/RH
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-2XR SB-41 (12.5-15)
TYPE: UD

WEIGHT OF SOIL (g)	515.58
LENGTH OF SAMPLE (in)	6.02
DIAMETER OF SAMPLE (in)	1.84
AREA OF SAMPLE (in^2)	2.66
VOLUME OF SAMPLE (in^3)	16.01
VOLUME OF SAMPLE (cm^3)	262.36

WET UNIT WEIGHT (pcf)	122.7

WEIGHT WET SOIL & TARE (g)	809.21
WEIGHT DRY SOIL & TARE (g)	724.89
WEIGHT OF TARE (g)	292.63
WEIGHT OF WATER (g)	84.32
WEIGHT OF DRY SOIL (g)	432.26
WATER CONTENT (%)	19.5

DRY UNIT WEIGHT (pcf)	102.7

REMARKS

TECH	FM
DATE	10/25/17
CHECK	
REVIEW	
APPROVE	

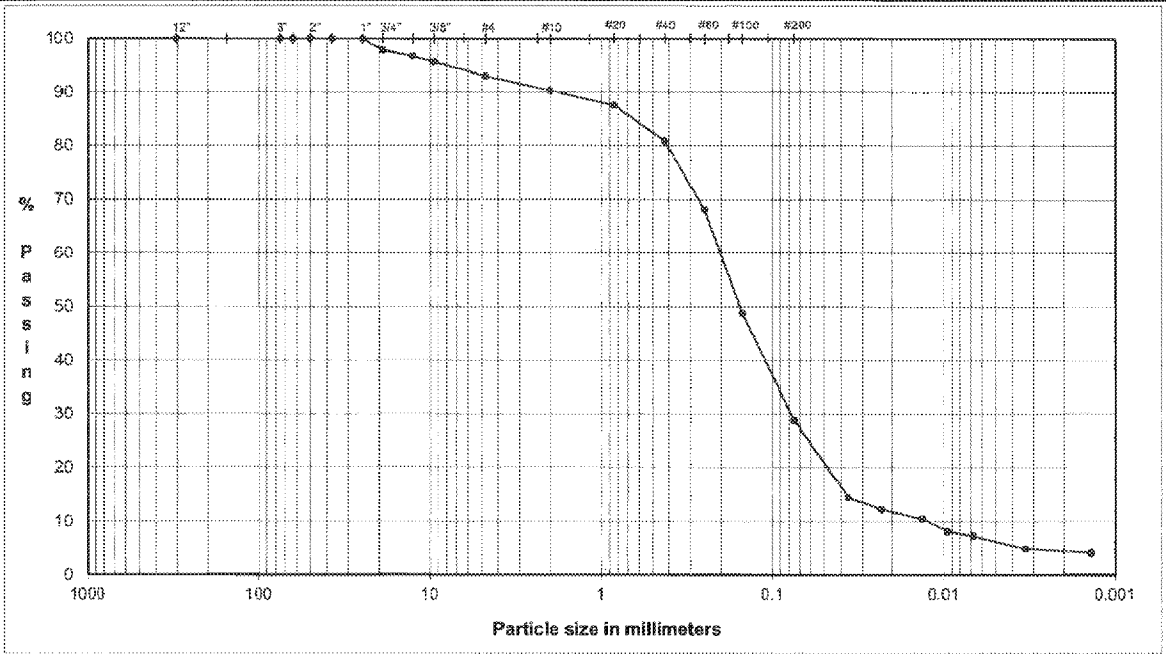
GOLDER ASSOCIATES INC.

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-3XR SB-41 (20-22.5)
TYPE: UD



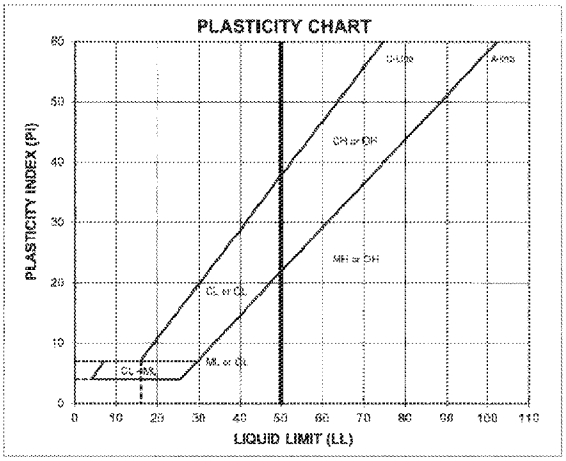
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	97.8	Coarse Gravel	2.2
0.50"	12.7	96.8		
0.375"	9.5	95.7		
#4	4.8	92.9	Fine Gravel	4.9
#10	2.00	90.3	Coarse Sand	2.6
#20	0.85	87.6		
#40	0.43	80.9	Medium Sand	9.4
#60	0.25	68.0		
#100	0.15	48.7		
#200	0.075	28.8	Fine Sand	52.1

Hydrometer Analysis

(mm)	%Finer		
0.026	14.6		
0.023	12.1		
0.013	10.5	Fines	
0.0096	8.1	Silt or Clay	28.8
0.0068	7.3		
0.0033	4.9		
0.0014	4.0		



ATTERBERG LIMITS
Method -B (Dry preparation)

M.	LL	PL	PI	LI
20.6	NP	NP	NP	NP

LL (oven-dried) / LL (NOT oven-dried)

DESCRIPTION: SILTY SAND, fine to coarse, some fine to coarse gravel; strong brown.

USCS: SM

TECH FT/RH
DATE 10/26/17
CHECK
REVIEW
APPROVE

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	SAMPLE ID	JC46221-3XR SB-41 (20-22.5)
		SAMPLE TYPE	UD
TESTED FOR	Gs	SAMPLE DEPTH	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	69.62
Weight Soil and Tare, Final (gm)	69.59
Weight Of Tare (gm)	43.26
Weight Of Moisture (gm)	0.03
Weight Of Dry Soil (gm)	26.33
Hygroscopic Moisture In (%)	0.1%

Test Method		**Method - B**
Pycnometer Number		24
Weight Pycnometer Empty (gm)		181.82
Volume of Pycnometer (gm)		499.54
Weight Pycnometer and Water (gm)		680.14
Mass of Pycnometer and Water at the test Temperture	(A)	680.25
Observed Temperature (Tb), for (Mb) In Degrees C		22.00
Weight of Soil, Water & Pycnometer (gm)	(B)	711.72
Temperature, C		22.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		50.33
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	50.33
Temperature Coefficient		0.9996

SPECIFIC GRAVITY (G) 2.667

$G @ 20^0 C = [C/(A-(B - C))]*(K)$

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	TJ
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-3XR SB-41 (20-22.5)
TYPE: UD

WEIGHT OF SOIL (g)	153.62
LENGTH OF SAMPLE (in)	2.14
DIAMETER OF SAMPLE (in)	1.77
AREA OF SAMPLE (in^2)	2.46
VOLUME OF SAMPLE (in^3)	5.27
VOLUME OF SAMPLE (cm^3)	86.36

WET UNIT WEIGHT (pcf)	111.1

WEIGHT WET SOIL & TARE (g)	101.61
WEIGHT DRY SOIL & TARE (g)	85.73
WEIGHT OF TARE (g)	8.67
WEIGHT OF WATER (g)	15.88
WEIGHT OF DRY SOIL (g)	77.06
WATER CONTENT (%)	20.6

DRY UNIT WEIGHT (pcf)	92.1

REMARKS

TECH	SDM
DATE	10/25/17
CHECK	
REVIEW	
APPROVE	

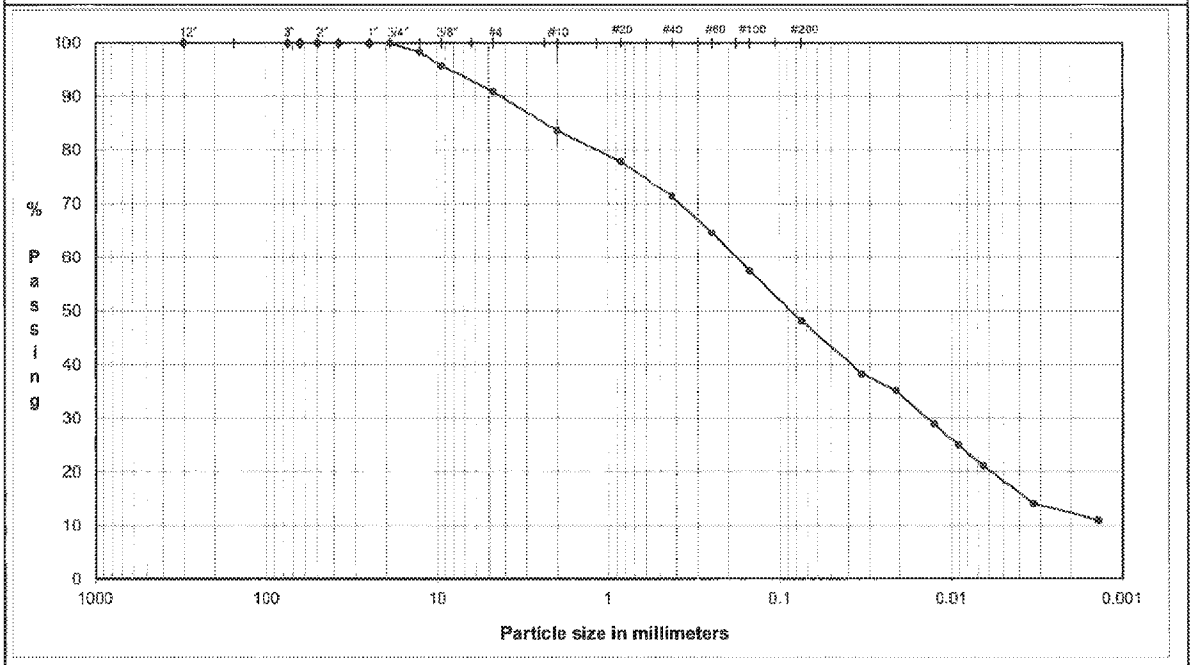
GOLDER ASSOCIATES INC.

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-4XR SB-42 (3-5.5)
TYPE: UD



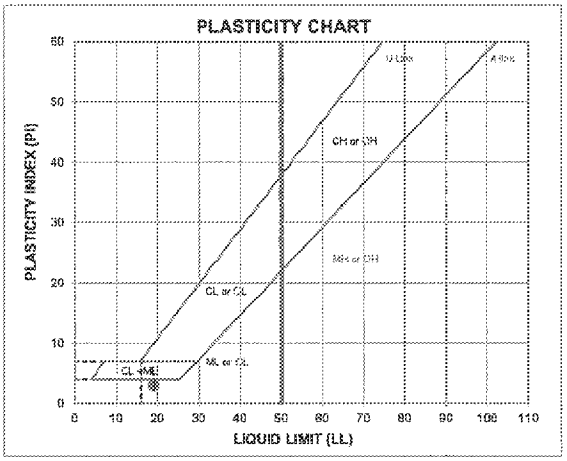
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	98.3		
0.375"	9.5	95.8		
#4	4.8	90.9	Fine Gravel	9.1
#10	2.00	83.6	Coarse Sand	7.3
#20	0.85	77.8		
#40	0.43	71.4	Medium Sand	12.2
#60	0.25	64.6		
#100	0.15	57.5		
#200	0.075	48.1	Fine Sand	23.3

Hydrometer Analysis

(mm)	%Finer		
0.033	38.2		
0.021	35.1		
0.013	28.9	Fines	
0.0091	25.0	Silt or Clay	48.1
0.0065	21.1		
0.0033	14.1		
0.0014	10.9		



ATTERBERG LIMITS
Method -B (Dry preparation)

M.	LL	PL	PI	LI
11.2	19	16	3	-1.66

LL (oven-dried) / 0.75 ORGANIC (COLOR)

DESCRIPTION: SAND and SILT, fine to coarse, some fine gravel; reddish brown and gray.

USCS: SM

NOTE:

TECH	FT/RH
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	SAMPLE ID	JC46221-4XR SB-42 (3-5.5)
		SAMPLE TYPE	UD
TESTED FOR	Gs	SAMPLE DEPTH	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	144.85
Weight Soil and Tare, Final (gm)	143.34
Weight Of Tare (gm)	41.82
Weight Of Moisture (gm)	1.51
Weight Of Dry Soil (gm)	101.52
Hygroscopic Moisture In (%)	1.5%

Test Method		Method - B
Pycnometer Number		29
Weight Pycnometer Empty (gm)		175.36
Volume of Pycnometer (gm)		499.56
Weight Pycnometer and Water (gm)		673.96
Mass of Pycnometer and Water at the test Temperture	(A)	673.81
Observed Temperature (Tb), for (Mb) In Degrees C		22.00
Weight of Soil, Water & Pycnometer (gm)	(B)	704.40
Temperature, C		22.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		49.72
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	49.72
Temperature Coefficient		0.9996

SPECIFIC GRAVITY (G) 2.599

$G @ 20^{0} C = [C/(A-(B - C))]*(K)$

METHOD - A	WET METHOD	METHOD OF AIR REMOVAL
METHOD - B	OVEN-DRIED METHOD	VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	TJ
DATE	10/27/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-4XR SB-42 (3-5.5)
TYPE: UD

WEIGHT OF SOIL (g)	608.89
LENGTH OF SAMPLE (in)	6.09
DIAMETER OF SAMPLE (in)	1.84
AREA OF SAMPLE (in^2)	2.66
VOLUME OF SAMPLE (in^3)	16.19
VOLUME OF SAMPLE (cm^3)	265.31

WET UNIT WEIGHT (pcf)	143.2

WEIGHT WET SOIL & TARE (g)	897.32
WEIGHT DRY SOIL & TARE (g)	836.05
WEIGHT OF TARE (g)	288.43
WEIGHT OF WATER (g)	61.27
WEIGHT OF DRY SOIL (g)	547.62
WATER CONTENT (%)	11.2

DRY UNIT WEIGHT (pcf)	128.8

REMARKS

TECH	SDM
DATE	10/25/17
CHECK	
REVIEW	
APPROVE	

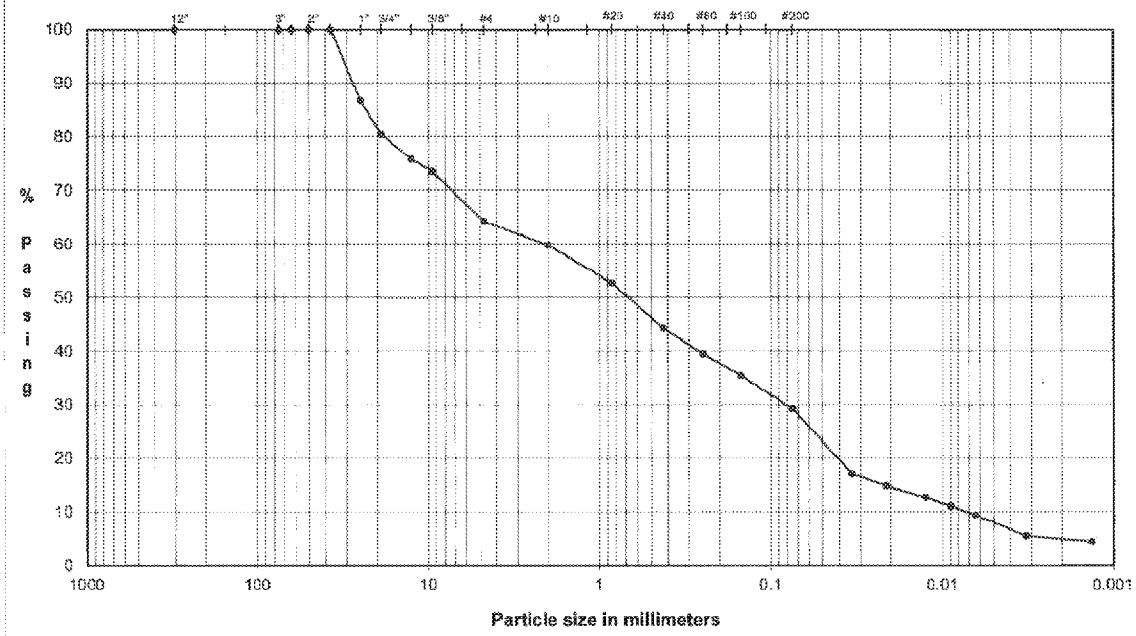
GOLDER ASSOCIATES INC.

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-5XR SB-44 (4-6.5)
TYPE: UD



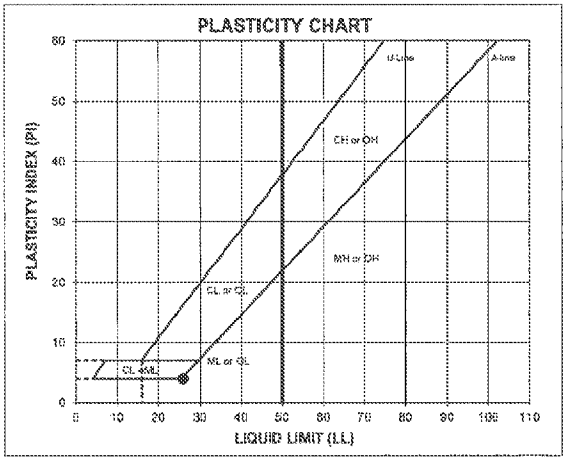
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	86.7		
0.75"	19.0	80.4	Coarse Gravel	19.6
0.50"	12.7	75.9		
0.375"	9.5	73.5		
#4	4.8	64.2	Fine Gravel	16.2
#10	2.00	59.8	Coarse Sand	4.4
#20	0.85	52.7		
#40	0.43	44.3	Medium Sand	15.5
#60	0.25	39.5		
#100	0.15	35.4		
#200	0.075	29.3	Fine Sand	15.0

Hydrometer Analysis

(mm)	%Finer		
0.034	17.1		
0.022	14.9		
0.013	12.7	Fines	
0.0090	11.0	Silt or Clay	29.3
0.0064	9.4		
0.0032	5.5		
0.0013	4.4		



ATTERBERG LIMITS
Method -B (Dry preparation)

ML	LL	PL	PI	LI
11.5	26	22	4	-3.06

LL (oven-dried) / 075 ORGANIC (COLOR)

DESCRIPTION: sandy CLAYEY GRAVEL to SILTY GRAVEL, fine to coarse, fine to coarse sand; reddish brown.

USCS: GC-GM

NOTE: *Insufficient sample received to perform in accordance with ASTM Standards*

TECH	FT
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	SAMPLE ID	JC46221-5XR SB-44 (4-6.5)
		SAMPLE TYPE	UD
TESTED FOR	Gs	SAMPLE DEPTH	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	89.60
Weight Soil and Tare, Final (gm)	89.20
Weight Of Tare (gm)	51.93
Weight Of Moisture (gm)	0.40
Weight Of Dry Soil (gm)	37.27
Hygroscopic Moisture In (%)	1.1%

Test Method		Method - B
Pycnometer Number		9
Weight Pycnometer Empty (gm)		180.57
Volume of Pycnometer (gm)		499.14
Weight Pycnometer and Water (gm)		678.39
Mass of Pycnometer and Water at the test Temperture	(A)	678.48
Observed Temperature (Th), for (Mb) In Degrees C		23.00
Weight of Soil, Water & Pycnometer (gm)	(B)	711.34
Temperature, C		23.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		51.38
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	51.38
Temperature Coefficient		0.9993

SPECIFIC GRAVITY (G) 2.772

$G @ 20^0 C = [C/(A-(B - C))]*(K)$

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

NOTE: Test conducted only on the minus No. 4 sieve material, insufficient material to test the plus No. 4 material (gravel).

TECH	FM
DATE	10/30/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-5XR SB-44 (4-6.5)
TYPE: UD

WEIGHT OF SOIL (g)	327.39
LENGTH OF SAMPLE (in)	4.97
DIAMETER OF SAMPLE (in)	1.85
AREA OF SAMPLE (in^2)	2.69
VOLUME OF SAMPLE (in^3)	13.36
VOLUME OF SAMPLE (cm^3)	218.93

WET UNIT WEIGHT (pcf)	93.4

WEIGHT WET SOIL & TARE (g)	108.27
WEIGHT DRY SOIL & TARE (g)	98.00
WEIGHT OF TARE (g)	8.74
WEIGHT OF WATER (g)	10.27
WEIGHT OF DRY SOIL (g)	89.26
WATER CONTENT (%)	11.5

DRY UNIT WEIGHT (pcf)	83.8

REMARKS

TECH	SDM
DATE	10/25/17
CHECK	
REVIEW	
APPROVE	

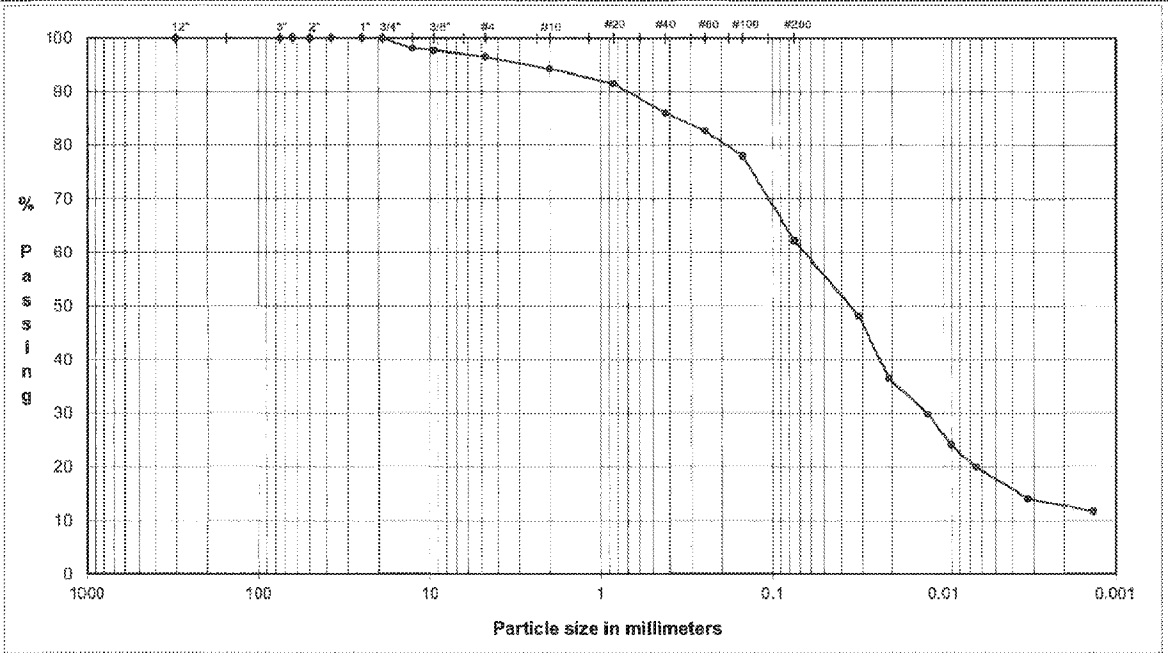
GOLDER ASSOCIATES INC.

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-6XR SB-44 (12-14.5)
TYPE: UD



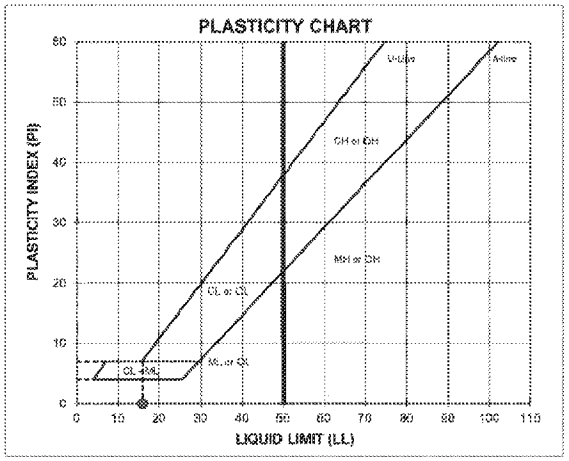
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	98.1		
0.375"	9.5	97.7		
#4	4.8	96.5	Fine Gravel	3.5
#10	2.00	94.3	Coarse Sand	2.2
#20	0.85	91.5		
#40	0.43	86.0	Medium Sand	8.2
#60	0.25	82.7		
#100	0.15	78.0		
#200	0.075	62.2	Fine Sand	23.8

Hydrometer Analysis

(mm)	%Finer		
0.032	48.2		
0.021	36.6		
0.012	29.9	Fines	
0.0091	24.1	Silt or Clay	62.2
0.0065	19.9		
0.0033	14.1		
0.0014	11.6		



ATTERBERG LIMITS
Method -B (Dry preparation)

M.	LL	PL	PI	LI
16.9	17	16	1	0.83

LL (oven-dried) (0.75 x OVENDRY / 0.75 x NATURAL)

DESCRIPTION: sandy SILT, fine to coarse, trace fine gravel; reddish brown.

USCS: ML

TECH FT/TJ
DATE 10/27/17
CHECK
REVIEW
APPROVE

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	SAMPLE ID	JC46221-6XR SB-44 (12-14.5)
		SAMPLE TYPE	UD
TESTED FOR	Gs	SAMPLE DEPTH	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	168.53
Weight Soil and Tare, Final (gm)	167.81
Weight Of Tare (gm)	51.21
Weight Of Moisture (gm)	0.72
Weight Of Dry Soil (gm)	116.60
Hygroscopic Moisture In (%)	0.6%

Test Method		Method - B
Pycnometer Number		17
Weight Pycnometer Empty (gm)		176.80
Volume of Pycnometer (gm)		499.52
Weight Pycnometer and Water (gm)		675.29
Mass of Pycnometer and Water at the test Temperture	(A)	675.09
Observed Temperature (Tb), for (Mb) In Degrees C		23.00
Weight of Soil, Water & Pycnometer (gm)	(B)	706.24
Temperature, C		23.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		50.04
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	50.04
Temperature Coefficient		0.9993

SPECIFIC GRAVITY (G) 2.647

$G @ 20^{0} C = [C/(A-(B - C))]*(K)$

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	TJ
DATE	10/27/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-6XR SB-44 (12-14.5)
TYPE: UD

WEIGHT OF SOIL (g)	590.80
LENGTH OF SAMPLE (in)	6.32
DIAMETER OF SAMPLE (in)	1.81
AREA OF SAMPLE (in^2)	2.57
VOLUME OF SAMPLE (in^3)	16.26
VOLUME OF SAMPLE (cm^3)	266.45

WET UNIT WEIGHT (pcf)	138.4

WEIGHT WET SOIL & TARE (g)	903.46
WEIGHT DRY SOIL & TARE (g)	818.21
WEIGHT OF TARE (g)	312.66
WEIGHT OF WATER (g)	85.25
WEIGHT OF DRY SOIL (g)	505.55
WATER CONTENT (%)	16.9

DRY UNIT WEIGHT (pcf)	118.4

REMARKS

TECH	TJ/SDM
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

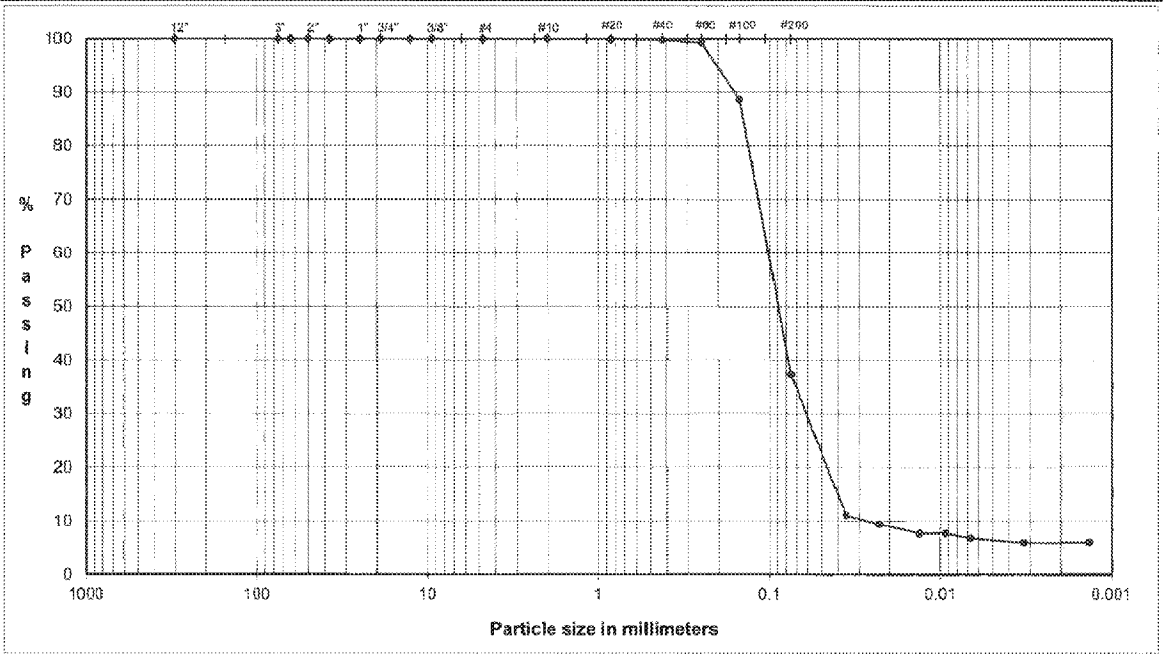
GOLDER ASSOCIATES INC.

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-7XR SB-44 (17.5-20)
TYPE: UD



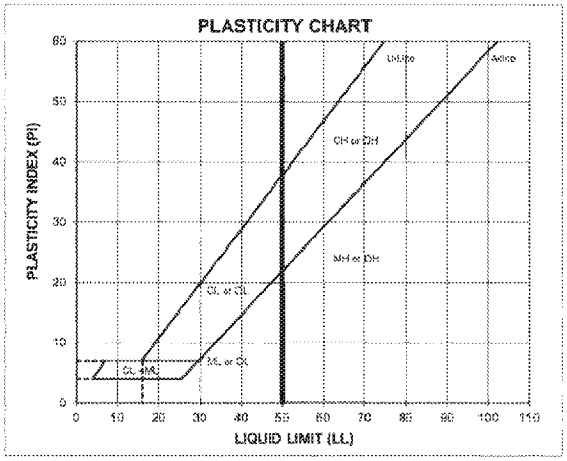
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	100.0	Coarse Sand	0.0
#20	0.85	99.9		
#40	0.43	99.8	Medium Sand	0.2
#60	0.25	99.3		
#100	0.15	88.6		
#200	0.075	37.3	Fine Sand	62.5

Hydrometer Analysis

(mm)	%Finer		
0.036	11.1		
0.025	9.4		
0.013	7.7	Fines	
0.0094	7.7	Silt or Clay	37.3
0.0067	6.8		
0.0033	6.0		
0.0014	6.0		



ATTERBERG LIMITS
Method -B (Dry preparation)

M.	LL	PL	PI	LI
15.6	NP	NP	NP	NP

LL (oven-dried) / LL (not dried)

DESCRIPTION: SAND and SILT, fine to medium; reddish brown.

USCS: SM

TECH FT/TJ
DATE 10/26/17
CHECK
REVIEW
APPROVE

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	**SAMPLE ID**	JC46221-7XR SB-44 (17.5-20)
		SAMPLE TYPE	UD
TESTED FOR	Gs	**SAMPLE DEPTH**	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	132.16
Weight Soil and Tare, Final (gm)	131.99
Weight Of Tare (gm)	51.57
Weight Of Moisture (gm)	0.17
Weight Of Dry Soil (gm)	80.42
Hygroscopic Moisture In (%)	0.2%

Test Method		Method - B
Pycnometer Number		14
Weight Pycnometer Empty (gm)		185.81
Volume of Pycnometer (gm)		499.35
Weight Pycnometer and Water (gm)		684.09
Mass of Pycnometer and Water at the test Temperture	(A)	683.93
Observed Temperature (Tb), for (Mb) In Degrees C		23.00
Weight of Soil, Water & Pycnometer (gm)	(B)	715.82
Temperature, C		23.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		50.51
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	50.51
Temperature Coefficient		0.9993

SPECIFIC GRAVITY (G) 2.711

G @ 20^{0} C = [C/(A-(B - C))]*(K)

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	TJ
DATE	10/27/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-7XR SB-44 (17.5-20)
TYPE: UD

WEIGHT OF SOIL (g)	339.13
LENGTH OF SAMPLE (in)	4.14
DIAMETER OF SAMPLE (in)	1.74
AREA OF SAMPLE (in^2)	2.38
VOLUME OF SAMPLE (in^3)	9.84
VOLUME OF SAMPLE (cm^3)	161.25

WET UNIT WEIGHT (pcf)	131.2

WEIGHT WET SOIL & TARE (g)	545.58
WEIGHT DRY SOIL & TARE (g)	499.89
WEIGHT OF TARE (g)	206.45
WEIGHT OF WATER (g)	45.69
WEIGHT OF DRY SOIL (g)	293.44
WATER CONTENT (%)	15.6

DRY UNIT WEIGHT (pcf)	113.5

REMARKS

TECH	TJ/SDM/RH
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

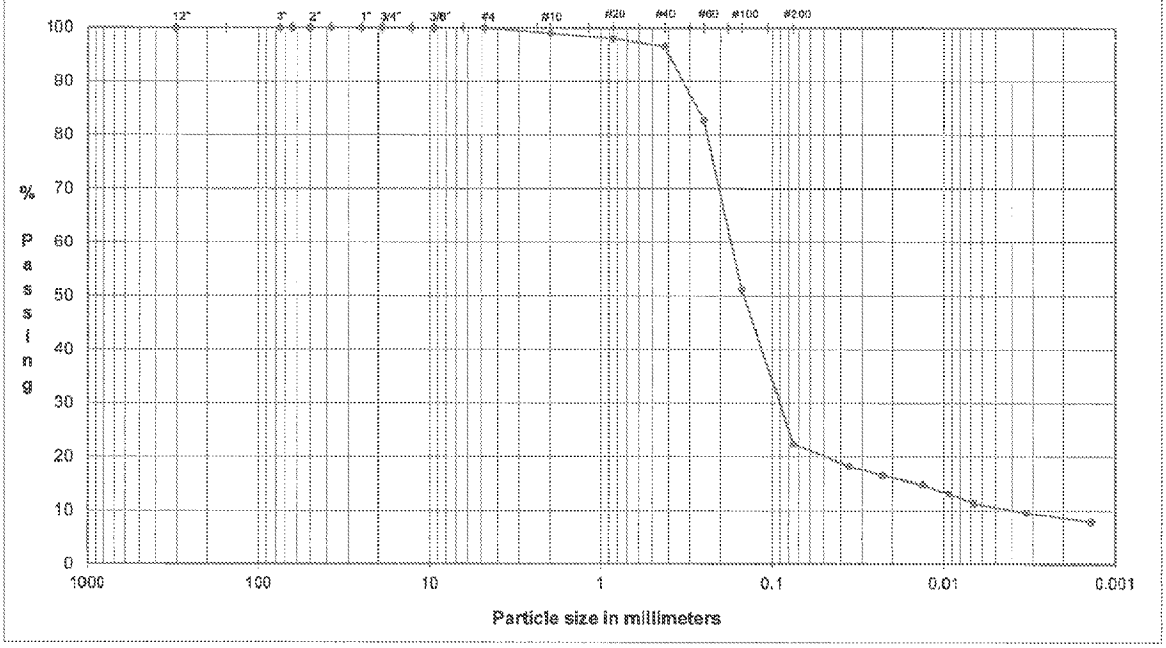
GOLDER ASSOCIATES INC.

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-8XR SB-46 (12.5-15)
TYPE: UD



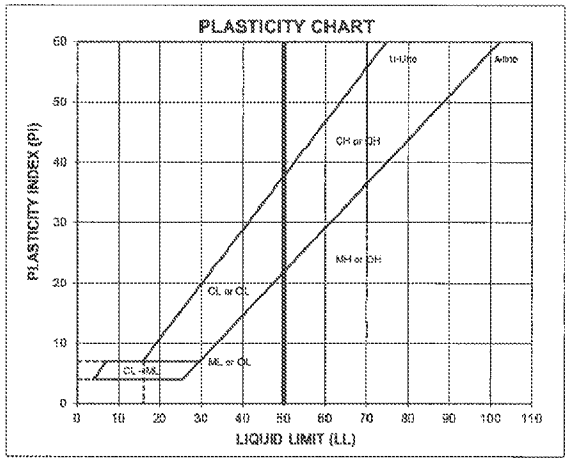
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	98.9	Coarse Sand	1.1
#20	0.85	97.9		
#40	0.43	96.5	Medium Sand	2.4
#60	0.25	82.6		
#100	0.15	51.8		
#200	0.075	22.4	Fine Sand	74.1

Hydrometer Analysis

(mm)	%Finer		
0.036	18.3		
0.023	16.6		
0.013	14.8	Fines	
0.0094	13.1	Silt or Clay	22.4
0.0067	11.3		
0.0033	9.6		
0.0014	7.8		



ATTERBERG LIMITS
Method -B (Dry preparation)

M.	LL	PL	PI	LI
4.2	NP	NP	NP	NP

LL (oven-dried) / LL - 0.75 - ORGANIC (OLOD0)

DESCRIPTION: SILTY SAND, fine to coarse; reddish brown.

USCS: SM

TECH	FT/RH/TJ
DATE	10/27/17
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	SAMPLE ID	JC46221-8XR SB-46 (12.5-15)
		SAMPLE TYPE	UD
TESTED FOR	Gs	SAMPLE DEPTH	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	104.12
Weight Soil and Tare, Final (gm)	104.02
Weight Of Tare (gm)	50.95
Weight Of Moisture (gm)	0.10
Weight Of Dry Soil (gm)	53.07
Hygroscopic Moisture In (%)	0.2%

Test Method		Method - B
Pycnometer Number		5
Weight Pycnometer Empty (gm)		177.11
Volume of Pycnometer (gm)		499.52
Weight Pycnometer and Water (gm)		675.59
Mass of Pycnometer and Water at the test Temperture	(A)	675.40
Observed Temperature (Tb), for (Mb) In Degrees C		23.00
Weight of Soil, Water & Pycnometer (gm)	(B)	722.27
Temperature, C		23.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		75.25
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	75.25
Temperature Coefficient		0.9993

SPECIFIC GRAVITY (G) 2.650

$G @ 20^{0} C = [C/(A-(B - C))]*(K)$

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	TJ
DATE	10/27/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-8XR SB-46 (12.5-15)
TYPE: UD

WEIGHT OF SOIL (g)	274.21
LENGTH OF SAMPLE (in)	4.18
DIAMETER OF SAMPLE (in)	1.83
AREA OF SAMPLE (in^2)	2.63
VOLUME OF SAMPLE (in^3)	10.99
VOLUME OF SAMPLE (cm^3)	180.09

WET UNIT WEIGHT (pcf)	95.0

WEIGHT WET SOIL & TARE (g)	479.52
WEIGHT DRY SOIL & TARE (g)	468.40
WEIGHT OF TARE (g)	205.31
WEIGHT OF WATER (g)	11.12
WEIGHT OF DRY SOIL (g)	263.09
WATER CONTENT (%)	4.2

DRY UNIT WEIGHT (pcf)	91.2

REMARKS

TECH	TJ/SDM
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

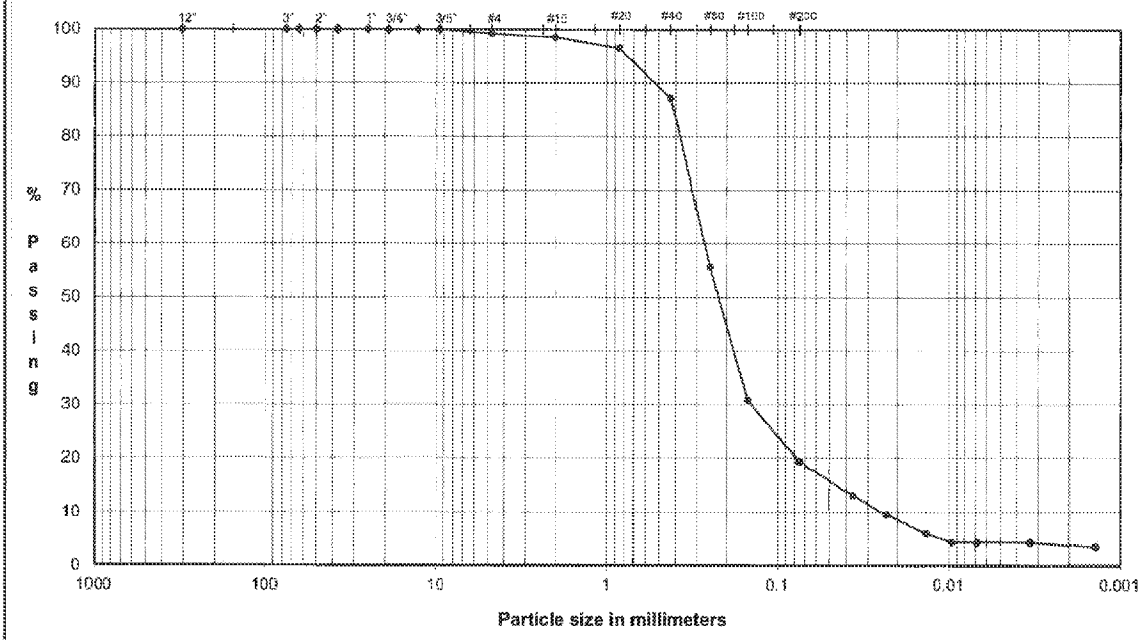
GOLDER ASSOCIATES INC.

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-9XR SB-48 (7.5-10)
TYPE: UD



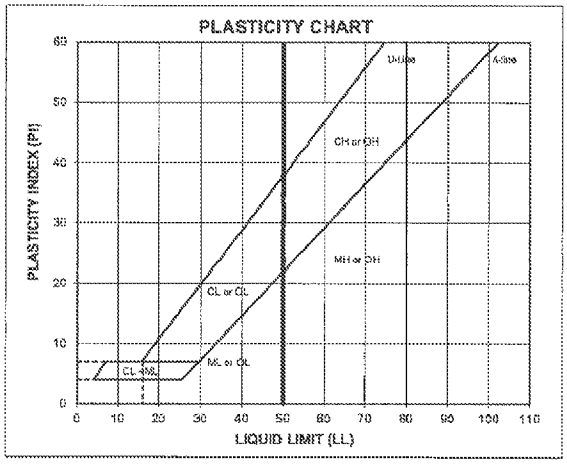
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	99.2	Fine Gravel	0.8
#10	2.00	98.4	Coarse Sand	0.8
#20	0.85	96.6		
#40	0.43	87.2	Medium Sand	11.3
#60	0.25	55.6		
#100	0.15	30.8		
#200	0.075	19.4	Fine Sand	67.8

Hydrometer Analysis

(mm)	%Finer		
0.036	13.0		
0.023	9.5		
0.014	6.0	Fines	
0.0097	4.3	Silt or Clay	19.4
0.0068	4.3		
0.0033	4.3		
0.0014	3.5		



ATTERBERG LIMITS
Method -B (Dry preparation)

M.	LL	PL	PI	LI
11.9	NP	NP	NP	NP

LL (oven-dried) / 0.75 ORGANIC (OL/OH)

DESCRIPTION: SILTY SAND, fine to coarse, trace fine gravel; strong brown.

USCS: SM

TECH	FT/RH
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	SAMPLE ID	JC46221-9XR SB-48 (7.5-10)
		SAMPLE TYPE	UD
TESTED FOR	Gs	SAMPLE DEPTH	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	150.20
Weight Soil and Tare, Final (gm)	150.05
Weight Of Tare (gm)	52.41
Weight Of Moisture (gm)	0.15
Weight Of Dry Soil (gm)	97.64
Hygroscopic Moisture In (%)	0.2%

Test Method		**Method - B**
Pycnometer Number		4
Weight Pycnometer Empty (gm)		184.56
Volume of Pycnometer (gm)		499.24
Weight Pycnometer and Water (gm)		682.65
Mass of Pycnometer and Water at the test Temperture	(A)	682.68
Observed Temperature (Tb), for (Mb) In Degrees C		22.00
Weight of Soil, Water & Pycnometer (gm)	(B)	729.51
Temperature, C		22.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		74.92
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	74.92
Temperature Coefficient		0.9996

SPECIFIC GRAVITY (G) **2.665**

$G @ 20^{0} C = [C/(A-(B - C))]*(K)$

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	TJ/RH
DATE	10/26/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-9XR SB-48 (7.5-10)
TYPE: UD

WEIGHT OF SOIL (g)	465.23
LENGTH OF SAMPLE (in)	4.71
DIAMETER OF SAMPLE (in)	1.88
AREA OF SAMPLE (in^2)	2.78
VOLUME OF SAMPLE (in^3)	13.07
VOLUME OF SAMPLE (cm^3)	214.18

WET UNIT WEIGHT (pcf)	135.6

WEIGHT WET SOIL & TARE (g)	692.31
WEIGHT DRY SOIL & TARE (g)	643.04
WEIGHT OF TARE (g)	227.28
WEIGHT OF WATER (g)	49.27
WEIGHT OF DRY SOIL (g)	415.76
WATER CONTENT (%)	11.9

DRY UNIT WEIGHT (pcf)	121.2

REMARKS

TECH	SDM
DATE	10/25/17
CHECK	
REVIEW	
APPROVE	

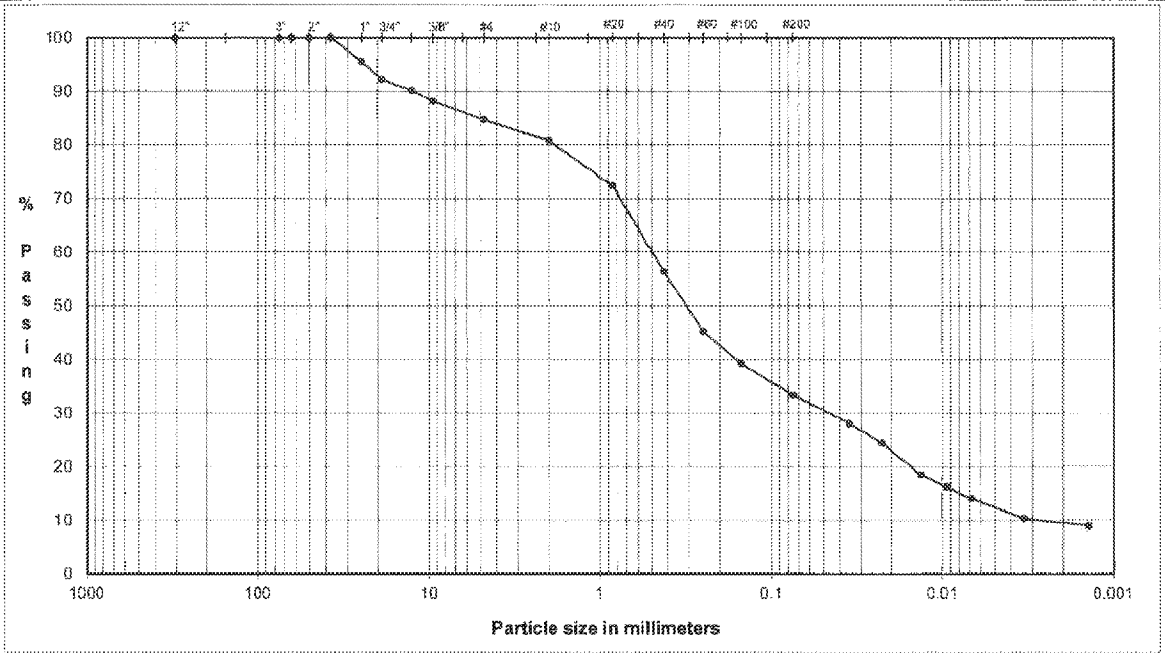
GOLDER ASSOCIATES INC.

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-10XR SB-50 (2.5-5)
TYPE: UD



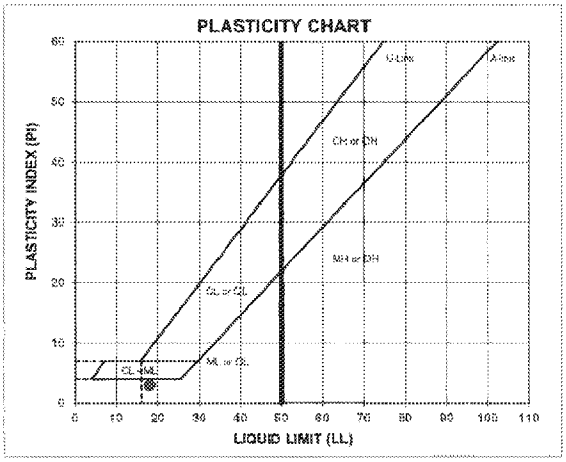
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	95.5		
0.75"	19.0	92.2	Coarse Gravel	7.8
0.50"	12.7	90.2		
0.375"	9.5	88.1		
#4	4.8	84.7	Fine Gravel	7.5
#10	2.00	80.8	Coarse Sand	3.9
#20	0.85	72.4		
#40	0.43	56.4	Medium Sand	24.4
#60	0.25	45.2		
#100	0.15	39.2		
#200	0.075	33.3	Fine Sand	23.1

Hydrometer Analysis

(mm)	%Finer		
0.035	28.1		
0.023	24.4		
0.013	18.5	Fines	
0.0095	16.3	Silt or Clay	33.3
0.0068	14.0		
0.0034	10.3		
0.0014	8.9		



ATTERBERG LIMITS
Method -B (Dry preparation)

M.	LL	PL	PI	LI
11.7	18	15	3	-0.99

LL (oven-dried) / LL (OVEN-DRIED) / LL(OD)

DESCRIPTION: gravelly SILTY SAND, fine to coarse, fine to coarse gravel; reddish brown.

USCS: SM

TECH	FT/TJ
DATE	10/27/17
CHECK	
REVIEW	
APPROVE	

NOTE: *Insufficient sample received to perform in accordance with ASTM Standards*

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	SAMPLE ID	JC46221-10XR SB-50 (2.5-5)
		SAMPLE TYPE	UD
TESTED FOR	Gs	SAMPLE DEPTH	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	115.42
Weight Soil and Tare, Final (gm)	115.33
Weight Of Tare (gm)	51.81
Weight Of Moisture (gm)	0.09
Weight Of Dry Soil (gm)	63.52
Hygroscopic Moisture In (%)	0.1%

Test Method		**Method - B**
Pycnometer Number		22
Weight Pycnometer Empty (gm)		185.37
Volume of Pycnometer (gm)		499.38
Weight Pycnometer and Water (gm)		683.68
Mass of Pycnometer and Water at the test Temperture	(A)	683.64
Observed Temperature (Tb), for (Mb) In Degrees C		22.00
Weight of Soil, Water & Pycnometer (gm)	(B)	714.64
Temperature, C		22.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		50.77
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	50.77
Temperature Coefficient		0.9996

SPECIFIC GRAVITY (G) 2.567

$G @ 20^{0} C = [C/(A-(B - C))]*(K)$

METHOD - A WET METHOD
METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

NOTE: Test conducted only on the minus No. 4 sieve material, insufficient material to test the plus No. 4 material (gravel).

TECH	TJ
DATE	10/27/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-10XR SB-50 (2.5-5)
TYPE: UD

WEIGHT OF SOIL (g)	538.83
LENGTH OF SAMPLE (in)	6.14
DIAMETER OF SAMPLE (in)	1.87
AREA OF SAMPLE (in^2)	2.75
VOLUME OF SAMPLE (in^3)	16.86
VOLUME OF SAMPLE (cm^3)	276.28

WET UNIT WEIGHT (pcf)	121.7

WEIGHT WET SOIL & TARE (g)	168.18
WEIGHT DRY SOIL & TARE (g)	151.50
WEIGHT OF TARE (g)	8.37
WEIGHT OF WATER (g)	16.68
WEIGHT OF DRY SOIL (g)	143.13
WATER CONTENT (%)	11.7

DRY UNIT WEIGHT (pcf)	109.0

REMARKS

TECH	SDM
DATE	10/25/17
CHECK	
REVIEW	
APPROVE	

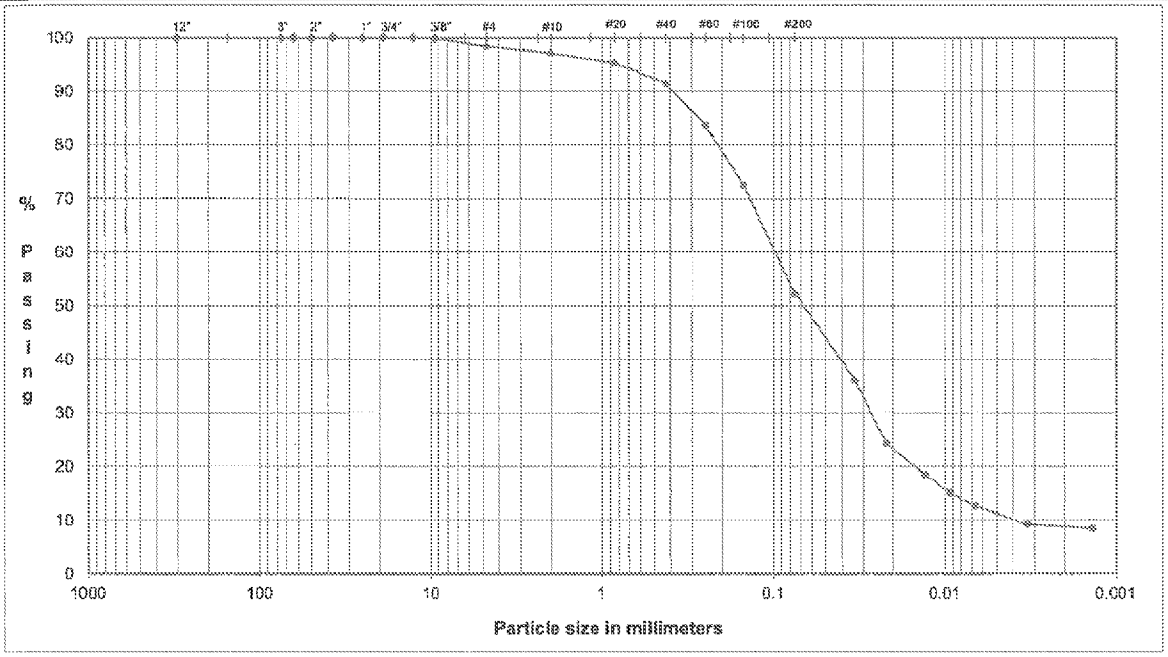
GOLDER ASSOCIATES INC.

OCTOBER 2017 1789925

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-11XR SB-46 (5-7.5)
TYPE: UD



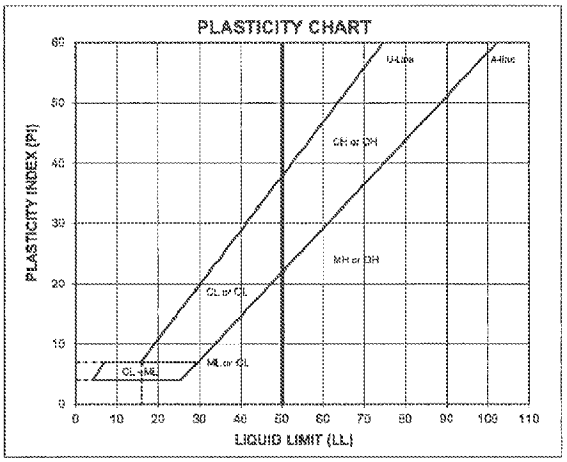
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	98.3	Fine Gravel	1.7
#10	2.00	97.1	Coarse Sand	1.2
#20	0.85	95.3		
#40	0.43	91.5	Medium Sand	5.7
#60	0.25	83.6		
#100	0.15	72.4		
#200	0.075	52.2	Fine Sand	39.3

Hydrometer Analysis

(mm)	%Finer		
0.033	36.0		
0.022	24.3		
0.013	18.4	Fines	
0.0093	15.1	Silt or Clay	52.2
0.0067	12.6		
0.0033	9.2		
0.0014	8.4		



ATTERBERG LIMITS
Method -B (Dry preparation)

M.	LL	PL	PI	LI
10.3	NP	NP	NP	NP

LL (oven-dried) / (not dried)
0.73 - ORGANIC (OLOI)

DESCRIPTION: SILT and SAND, fine to coarse, trace fine gravel; reddish brown.

USCS: ML

TECH	FT/TJ
DATE	10/27/17
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

2

SPECIFIC GRAVITY OF SOILS
ASTM D-854
PYCNOMETER METHOD

PROJECT TITLE	SGS ACCUTEST / JC46221XR GE-HARRISON / NJ		
PROJECT NUMBER	1789925	SAMPLE ID	JC46221-11XR SB-46 (5-7.5)
		SAMPLE TYPE	UD
TESTED FOR	Gs	SAMPLE DEPTH	-

MOISTURE CONTENT OF MATERIAL PASSING THE #4 SIEVE

Weight Soil and Tare, Initial (gm)	163.28
Weight Soil and Tare, Final (gm)	162.80
Weight Of Tare (gm)	51.84
Weight Of Moisture (gm)	0.48
Weight Of Dry Soil (gm)	110.96
Hygroscopic Moisture In (%)	0.4%

Test Method		Method - B
Pycnometer Number		12
Weight Pycnometer Empty (gm)		177.28
Volume of Pycnometer (gm)		499.48
Weight Pycnometer and Water (gm)		675.80
Mass of Pycnometer and Water at the test Temperture	(A)	675.53
Observed Temperature (Tb), for (Mb) In Degrees C		23.00
Weight of Soil, Water & Pycnometer (gm)	(B)	707.03
Temperature, C		23.0
Density of water @ tested temperature (g/ml)		1.00
Tare Number		-
Weight of Dry Soil Slurry plus Tare		50.57
Weight of Tare		0.00
Weight of Dry Soil (gm)	(C)	50.57
Temperature Coefficient		0.9993

SPECIFIC GRAVITY (G) 2.650

G @ 20° C = [C/(A-(B - C))]*(K)

METHOD - A WET METHOD

METHOD - B OVEN-DRIED METHOD

METHOD OF AIR REMOVAL: VACUUM

Recommended Mass for Test Specimen

Soil Type	Specimen Dry Mass when using 500 ml Pycnometer
SP, SP-SM	100
SP-SC, SM , SC	75
SILT OR CLAY	50

TECH	TJ
DATE	10/27/17
CHECK	
REVIEW	
APPROVE	

OCTOBER 2017 1789925

UNIT WEIGHT DETERMINATION

ASTM D 2937

PROJECT NAME: SGS ACCUTEST / JC46221XR GE-HARRISON / NJ
SAMPLE ID: JC46221-11XR SB-46 (5-7.5)
TYPE: UD

WEIGHT OF SOIL (g)	388.89
LENGTH OF SAMPLE (in)	4.24
DIAMETER OF SAMPLE (in)	1.83
AREA OF SAMPLE (in^2)	2.63
VOLUME OF SAMPLE (in^3)	11.15
VOLUME OF SAMPLE (cm^3)	182.72

WET UNIT WEIGHT (pcf)	132.8

WEIGHT WET SOIL & TARE (g)	603.15
WEIGHT DRY SOIL & TARE (g)	549.28
WEIGHT OF TARE (g)	24.26
WEIGHT OF WATER (g)	53.87
WEIGHT OF DRY SOIL (g)	525.02
WATER CONTENT (%)	10.3

DRY UNIT WEIGHT (pcf)	120.4

REMARKS

TECH	SDM/FT
DATE	10/25/17
CHECK	
REVIEW	
APPROVE	

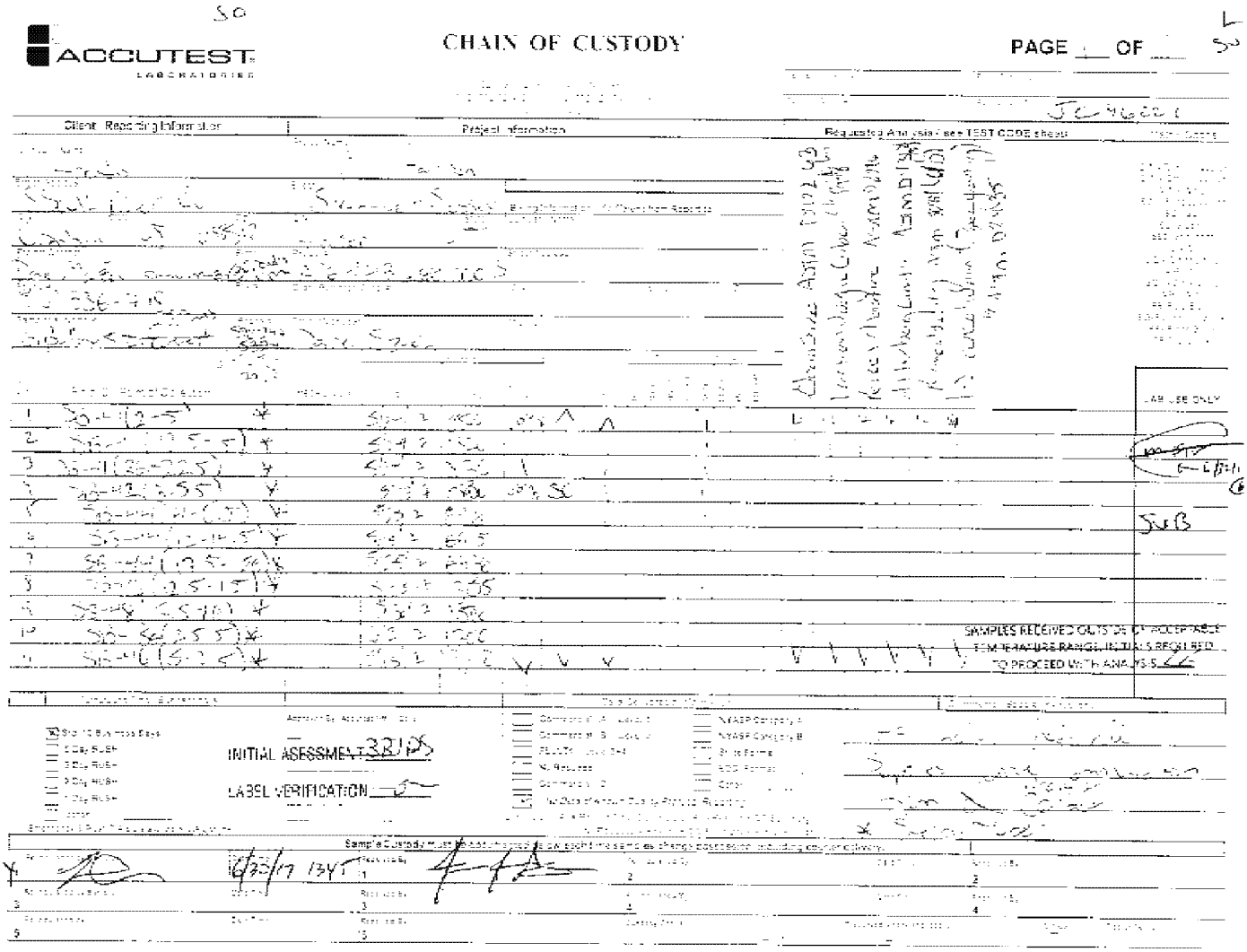
GOLDER ASSOCIATES INC.

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody


ACCUTEST LABORATORIES

CHAIN OF CUSTODY

PAGE __ OF __

Client / Reporting Information | Project Information | Requested Analysis (see TEST CODE sheet)

LAB USE ONLY

SAMPLES RECEIVED OUTSIDE ACCEPTABLE TEMPERATURE RANGE, INITIALS REQUIRED TO PROCEED WITH ANALYSIS

INITIAL ASSESSMENT 3215

LABEL VERIFICATION

Sample Custody must be documented below each time samples change possession, including courier delivery.

JC46221XR: Chain of Custody
Page 1 of 8

SGS Accutest Sample Receipt Summary

Job Number: JC46221 **Client:** Arcadis **Project:** GE Harrison

Date / Time Received: 6/30/2017 1:45:00 PM **Delivery Method:** Client **Airbill #'s:**

Cooler Temps (Raw Measured) °C:

Cooler Temps (Corrected) °C:

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☐	☐
2. Cooler temp verification:	N/A	
3. Cooler media:	N/A	
4. No. Coolers:	N/A	

Quality Control Preservation	Y	N	N/A
1. Trip Blank present / cooler:	☐	☐	☑
2. Trip Blank listed on COC:	☐	☐	☑
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☐	☐	☑

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Comments 1) Samples rec'd in Shelby Tubes, temp not a factor.

SM089-02
Rev. Date 12/1/16

Responded to by: CSR: N/A

Response Date: Response Date: 7/3/2017

Response:

Response: Proceed with analysis

Job Change Order: JC46221

Requested Date:	8/1/2017	**Received Date:**	6/30/2017
Account Name:	Arcadis	**Due Date:**	7/14/2017
Project Description:	GE-Harrison, Sixth Avenue and Sussex Street, Harr	**Deliverable:**	REDT2
CSR:	DianeK	**TAT (Days):**	1

Sample #: JC46221-all

Dept:

TAT: 1

Change:
add "EXTSOTRAGE" for 45 days

Above Changes Per: Dave Maza **Date/Time:** 8/1/2017 7:25:07 AM

To Client: This Change Order is confirmation of the revisions, previously discussed with the SGS Accutest Client Service Representative.

Job Change Order: JC46221

Requested Date:	9/22/2017	**Received Date:**	6/30/2017
Account Name:	Arcadis	**Due Date:**	7/14/2017
Project Description:	GE-Harrison, Sixth Avenue and Sussex Street, Harr	**Deliverable:**	REDT2
CSR:	dianek	**TAT (Days):**	90

Sample #: JC46221-all

Dept:

TAT: 90

Change:
Please add an additional 90 days of extended storage "EXTSTORAGE"

Above Changes Per: Diane Komar **Date/Time:** 9/22/2017 8:34:02 PM

To Client: This Change Order is confirmation of the revisions, previously discussed with the SGS Accutest Client Service Representative.

Job Change Order: JC46221X

Requested Date:	10/17/2017	**Received Date:**	6/30/2017
Account Name:	Arcadis	**Due Date:**	7/14/2017
Project Description:	GE-Harrison, Sixth Avenue and Sussex Street, Harr	**Deliverable:**	REDT2
C/O Initiated By:	dianek **PM:** DK	**TAT (Days):**	14

Sample #: JC46221X-1 thru 7
Dept:
TAT: 14

Change:
Take off HOLD and sub to Golder for :GRAINS, ATTERBERG, SSHELBYEXT

Sample #: JC46221X-9, 10
Dept:
TAT: 14

Change:
Take off HOLD and sub to Golder for :GRAINS, ATTERBERG, SSHELBYEXT

Above Changes Per: Dave Maza **Date/Time:** 10/17/2017 5:41:24 PM

To Client: This Change Order is confirmation of the revisions, previously discussed with the SGS Accutest Client Service Representative.

Job Change Order: JC46221XR

Requested Date:	10/20/2017	**Received Date:**	6/30/2017
Account Name:	Arcadis	**Due Date:**	10/31/2017
Project Description:	GE-Harrison, Sixth Avenue and Sussex Street, Harr	**Deliverable:**	REDT2
C/O Initiated By:	dianek **PM:** DK	**TAT (Days):**	14

Sample #: JC46221XR-11

Dept:

TAT: 14

Change:
Take off HOLD and log in for: GRAINS (sub to Golder), ATTERBERG, SSHELBYEXT

Above Changes Per: Dave Maza **Date/Time:** 10/20/2017 5:50:06 PM

To Client: This Change Order is confirmation of the revisions, previously discussed with the SGS Accutest Client Service Representative.

3.1 3

JC46221XR: Chain of Custody
Page 7 of 8

Job Change Order: JC46221

Requested Date:	10/31/2017	**Received Date:**	6/30/2017
Account Name:	Arcadis	**Due Date:**	7/14/2017
Project Description:	GE-Harrison, Sixth Avenue and Sussex Street, Harr	**Deliverable:**	REDT2
C/O Initiated By:	dianek **PM:** DK	**TAT (Days):**	14

Sample #: JC46221-1, 2, 3, 4, 5, 6, 7, 9, 10, 11

Change: Relog for XFOCNJ, ASTMOIST, (Moisture results from Golder to be used)

Dept:

TAT: 14

Above Changes Per: Dave Maza **Date/Time:** 10/31/2017 2:37:24 PM

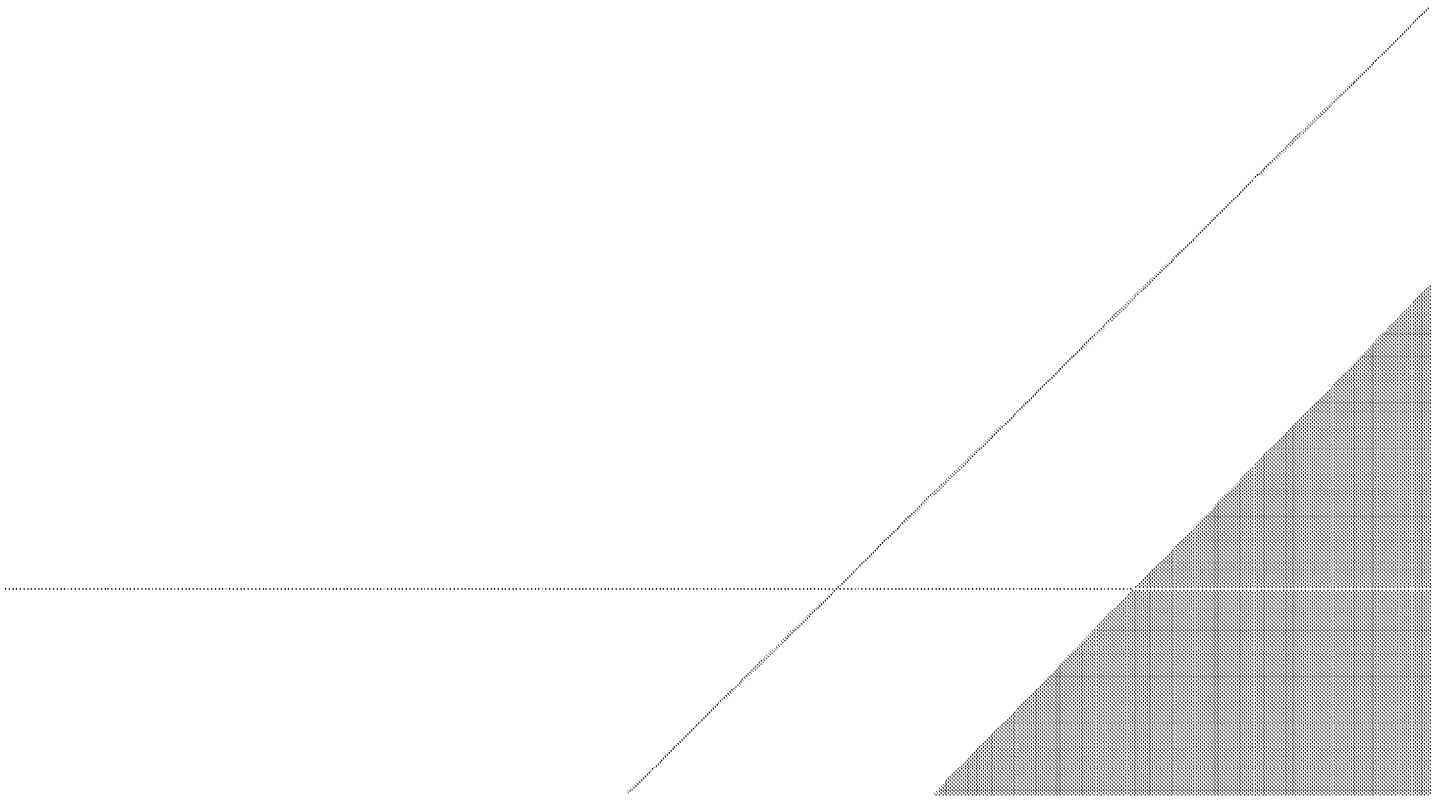
To Client: This Change Order is confirmation of the revisions, previously discussed with the SGS Accutest Client Service Representative.

Page 1 of 1

3.1 3

JC46221XR: Chain of Custody
Page 8 of 8

ATTACHMENT 2



Sand		Clay		Silt		USDA Texture
% Sand 1	62.20%	% Clay 1	13.00%	% Silt 1	24.80%	SANDY LOAM
% Sand 2	71.30%	% Clay 2	3.20%	% Silt 2	25.50%	SANDY LOAM
% Sand 3	77.90%	% Clay 3	4.80%	% Silt 3	17.30%	LOAMY SAND
% Sand 4	49.90%	% Clay 4	14.30%	% Silt 4	35.80%	LOAM

LEGEND:
- SB-41(2-5)
- SB-41(12.5-15)
- SB-41(20-22.5)
- SB-42(3-5.5)

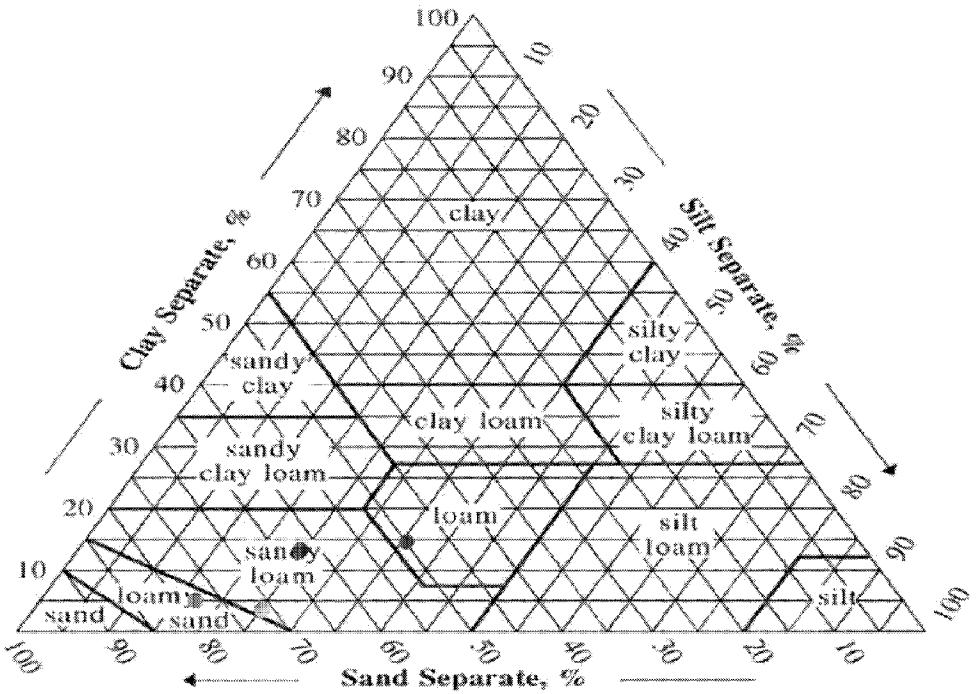
Optional Sand 1	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Optional Sand 2	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Optional Sand 3	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Optional Sand 4	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Soil Texture Triangle



BLOCK 165 PORTION OF THE FORMER RCA FACILITY
HARRISON, NEW JERSEY

USDA SOIL TEXTURE CALCULATOR
SB-41(2-5), SB-41(12.5-15), SB-41(20-22.5), SB-42(3-5.5)

ARCADIS Design & Consultancy for natural and built assets

ATTACHMENT **2a**

GECO-FED-0000021486

Sand		Clay		Silt		USDA Texture
% Sand 1	63.80%	% Clay 1	8.00%	% Silt 1	28.20%	SANDY LOAM
% Sand 2	43.30%	% Clay 2	13.20%	% Silt 2	43.50%	LOAM
% Sand 3	79.10%	% Clay 3	6.00%	% Silt 3	14.90%	LOAMY SAND
% Sand 4	79.90%	% Clay 4	8.50%	% Silt 4	11.60%	LOAMY SAND

LEGEND:
- SB-44(4-6.5)
- SB-44(12-14.5)
- SB-44(17.5-20)
- SB-46(12.5-15)

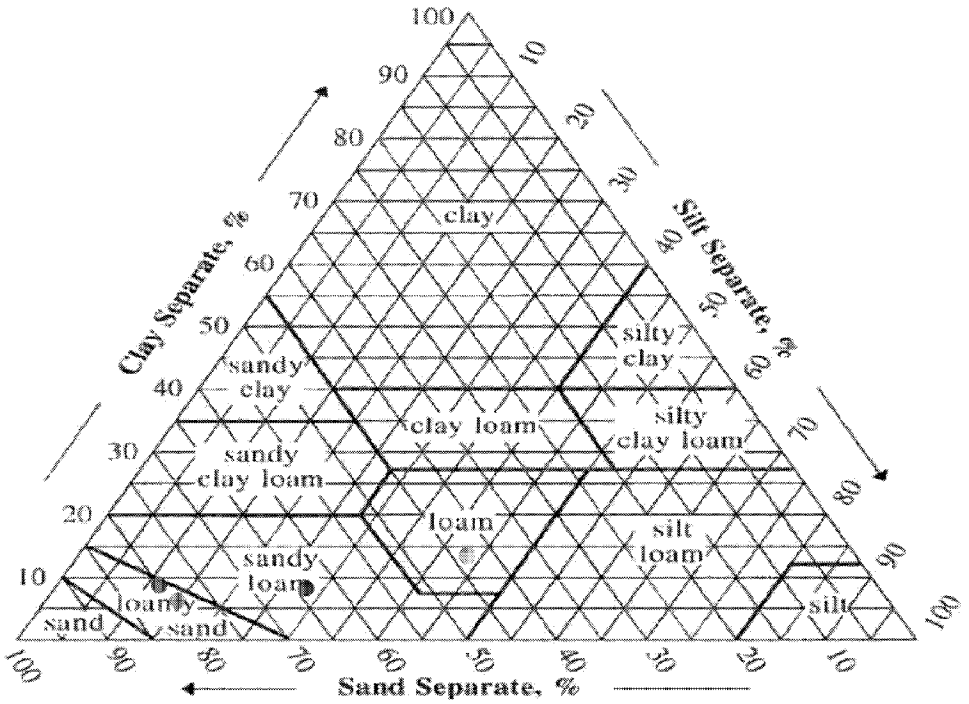
Optional Sand 1	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Optional Sand 2	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Optional Sand 3	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Optional Sand 4	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Soil Texture Triangle



BLOCK 165 PORTION OF THE FORMER RCA FACILITY
HARRISON, NEW JERSEY

USDA SOIL TEXTURE CALCULATOR
SB-44(4-6.5), SB-44(12-14.5), SB-44(17.5-20), SB-46(12.5-15)

ARCADIS Design & Consultancy for natural and built assets

ATTACHMENT 2b

GECO-FED-0000021487

Sand		Clay		Silt		USDA Texture
% Sand 1	84.30%	%Clay 1	3.80%	% Silt 1	11.90%	LOAMY SAND
% Sand 2	62.80%	%Clay 2	11.60%	% Silt 2	25.60%	SANDY LOAM
% Sand 3	56.70%	%Clay 3	8.90%	% Silt 3	34.40%	SANDY LOAM
% Sand 4	63.80%	%Clay 4	8.50%	% Silt 4	27.70%	SANDY LOAM

LEGEND:
- SB-48(7.5-10)
- SB-50(2.5-5)
- SB-46(5-7.5)
- MEDIAN

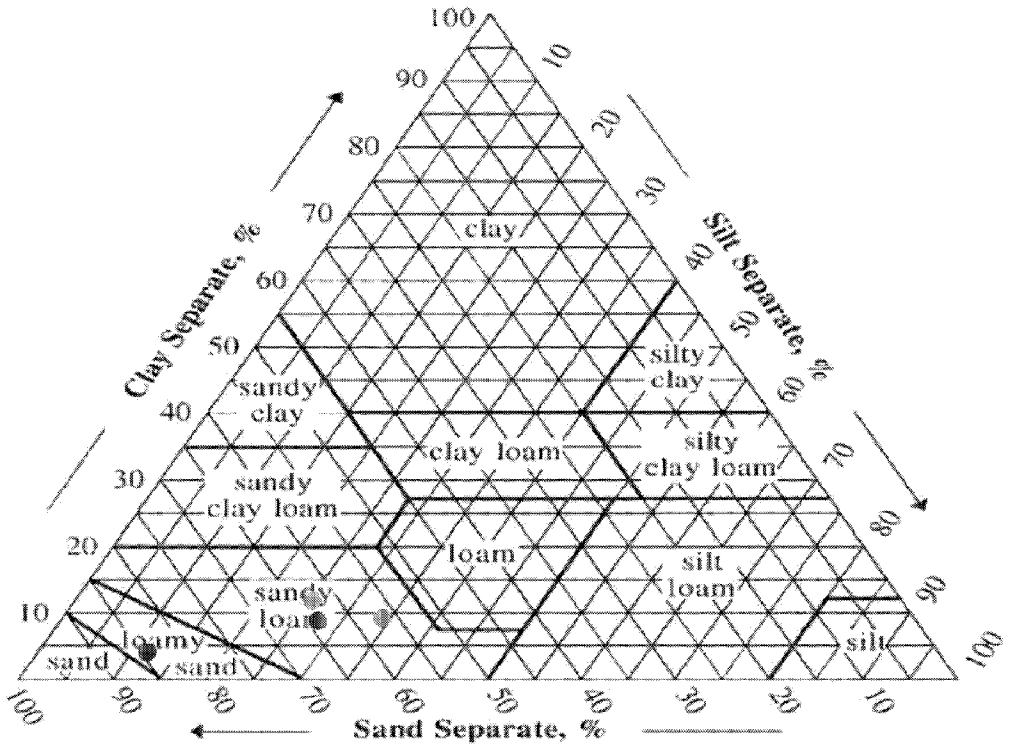
Optional Sand 1	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Optional Sand 2	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Optional Sand 3	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Optional Sand 4	
% Very Coarse	0.00%
% Coarse	0.00%
% Medium	0.00%
% Fine	0.00%
% Very Fine	0.00%

Soil Texture Triangle



BLOCK 165 PORTION OF THE FORMER RCA FACILITY
HARRISON, NEW JERSEY

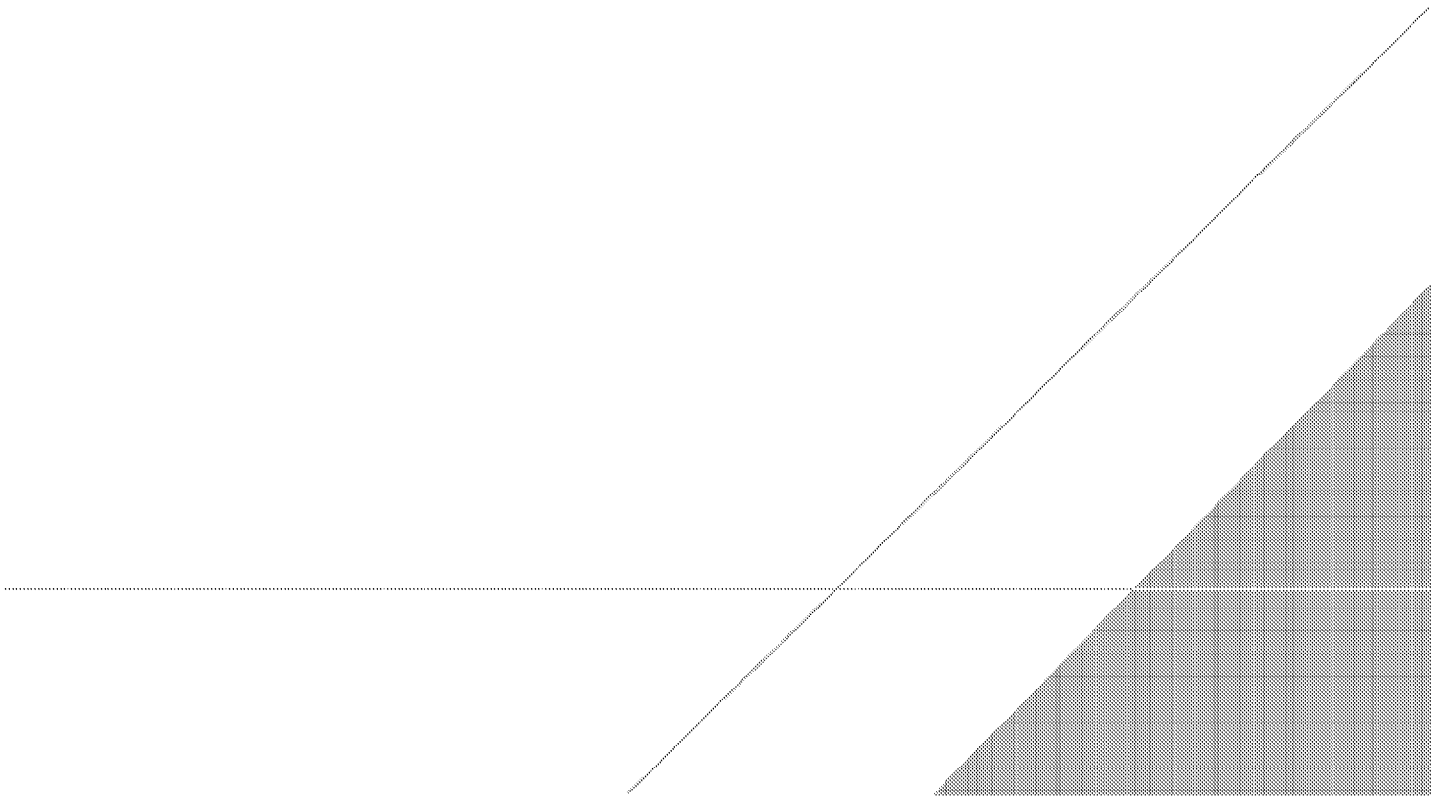
USDA SOIL TEXTURE CALCULATOR
SB-48(7.5-10), SB-50(2.5-5), SB-46(5-7.5), MEDIAN

ARCADIS Design & Consultancy for natural and built assets

ATTACHMENT 2c

GECO-FED-0000021488

ATTACHMENT 3



DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67641		Acetone

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.06E-01	1.15E-05	3.50E-05	25	6,955	328.65	508.00	2.36E+00	1.00E+06	0	3.1E+01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	7,513	2.06E-05	8.76E-04	1.76E-04	1.07E-02	0.00E+00	0.00E+00	2.06E-03	7.51E-03	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	8.76E-01	0.45	1.37E+02	1.07E-02	1.80E+03	6.87E+30	8.59E-04	7.52E-04	NA	3.1E+01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	4.30E+07	4.30E+07	1.00E+09	4.30E+07

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432		Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, h_B (cm)	ENTER Thickness of soil stratum C, h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.95E-02	1.03E-05	5.55E-03	25	7,342	353.15	562.05	1.46E+02	1.79E+03	7.8E-06	3.0E-02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	8,090	3.13E-03	1.33E-01	1.76E-04	9.04E-03	0.00E+00	0.00E+00	8.63E-05	7.81E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.33E+02	0.45	1.37E+02	9.04E-03	1.80E+03	4.30E+36	1.20E-04	1.60E-02	7.8E-06	3.0E-02

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)	Adjusted Benzene Value (µg/L)
1.95E+01	1.95E+03	1.95E+01	1.79E+06	1.95E+01	NA	NA	195

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75274		Bromodichloromethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
5.63E-02	1.07E-05	2.12E-03	25	7,800	363.15	585.85	3.18E+01	3.03E+03	3.7E-05	0

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	8,636	1.15E-03	4.90E-02	1.76E-04	5.68E-03	0.00E+00	0.00E+00	7.96E-05	6.96E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	4.90E+01	0.45	1.37E+02	5.68E-03	1.80E+03	1.96E+58	1.08E-04	5.27E-03	3.7E-05	NA

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
1.25E+01	NA	1.25E+01	3.03E+06	1.25E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75252		Bromoform

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.57E-02	1.04E-05	5.35E-04	25	9,479	422.25	696.00	3.18E+01	3.10E+03	1.1E-06	0

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	10,842	2.48E-04	1.06E-02	1.76E-04	3.61E-03	0.00E+00	0.00E+00	1.77E-04	1.21E-03	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.06E+01	0.45	1.37E+02	3.61E-03	1.80E+03	5.16E+91	1.83E-04	1.93E-03	1.1E-06	NA

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
1.14E+03	NA	1.14E+03	3.10E+06	1.14E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
74839		Methyl bromide

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.00E-01	1.35E-05	7.34E-03	25	5,714	276.65	467.15	1.32E+01	1.52E+04	0	5.0E-03

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	5,621	4.93E-03	2.10E-01	1.76E-04	1.01E-02	0.00E+00	0.00E+00	9.35E-05	8.48E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	2.10E+02	0.45	1.37E+02	1.01E-02	1.80E+03	4.35E+32	1.30E-04	2.73E-02	NA	5.0E-03

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	1.91E+02	1.91E+02	1.52E+07	1.91E+02

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
78933		2-Butanone

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
9.14E-02	1.02E-05	5.69E-05	25	7,481	352.65	536.70	4.51E+00	2.23E+05	0	5.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	8,386	3.14E-05	1.34E-03	1.76E-04	9.26E-03	0.00E+00	0.00E+00	1.22E-03	5.53E-03	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.34E+00	0.45	1.37E+02	9.26E-03	1.80E+03	5.87E+35	6.85E-04	9.17E-04	NA	5.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	5.69E+06	5.69E+06	2.23E+08	5.69E+06

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75150		Carbon disulfide

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.06E-01	1.30E-05	1.44E-02	25	6,391	319.15	553.15	2.17E+01	2.16E+03	0	7.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	6,659	8.99E-03	3.83E-01	1.76E-04	1.07E-02	0.00E+00	0.00E+00	9.39E-05	8.55E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	3.83E+02	0.45	1.37E+02	1.07E-02	1.80E+03	6.53E+30	1.31E-04	5.02E-02	NA	7.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	1.45E+04	1.45E+04	2.16E+06	1.45E+04

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
56235		Carbon tetrachloride

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
5.71E-02	9.78E-06	2.76E-02	25	7,127	349.95	556.35	4.39E+01	7.93E+02	6.0E-06	1.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	7,830	1.59E-02	6.75E-01	1.76E-04	5.77E-03	0.00E+00	0.00E+00	4.98E-05	4.54E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	6.75E+02	0.45	1.37E+02	5.77E-03	1.80E+03	2.52E+57	7.11E-05	4.80E-02	6.0E-06	1.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
8.44E+00	2.17E+03	8.44E+00	7.93E+05	8.44E+00

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907		Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.21E-02	9.48E-06	3.11E-03	25	8,410	404.85	632.00	2.34E+02	4.98E+02	0	5.0E-02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	9,776	1.56E-03	6.63E-02	1.76E-04	7.28E-03	0.00E+00	0.00E+00	8.16E-05	7.29E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	6.63E+01	0.45	1.37E+02	7.28E-03	1.80E+03	2.97E+45	1.12E-04	7.46E-03	NA	5.0E-02

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	6.99E+03	6.99E+03	4.98E+05	6.99E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75003		Chloroethane (ethyl chloride)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.04E-01	1.16E-05	1.11E-02	25	5,879	285.45	460.15	2.17E+01	6.71E+03	0	1.0E+01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	5,871	7.33E-03	3.12E-01	1.76E-04	1.05E-02	0.00E+00	0.00E+00	9.21E-05	8.39E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	3.12E+02	0.45	1.37E+02	1.05E-02	1.80E+03	4.12E+31	1.29E-04	4.02E-02	NA	1.0E+01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	2.60E+05	2.60E+05	6.71E+06	2.60E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67663		Chloroform

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Looku				Lookup			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.69E-02	1.09E-05	3.67E-03	25	6,988	334.25	536.40	3.18E+01	7.95E+03	2.3E-05	9.8E-02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	7,522	2.15E-03	9.18E-02	1.76E-04	7.77E-03	0.00E+00	0.00E+00	8.19E-05	7.36E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	9.18E+01	0.45	1.37E+02	7.77E-03	1.80E+03	4.38E+42	1.14E-04	1.04E-02	2.3E-05	9.8E-02

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
1.02E+01	9.81E+03	1.02E+01	7.95E+06	1.02E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
74873		Methyl chloride (chloromethane)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	Thickness of soil stratum B, (Enter value or 0) h_B (cm)	Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.24E-01	1.36E-05	8.82E-03	25	5,115	249.15	416.25	1.32E+01	5.32E+03	0	9.0E-02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	4,713	6.32E-03	2.69E-01	1.76E-04	1.25E-02	0.00E+00	0.00E+00	1.11E-04	1.01E-03	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	2.69E+02	0.45	1.37E+02	1.25E-02	1.80E+03	2.89E+26	1.54E-04	4.14E-02	NA	9.0E-02

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	2.27E+03	2.27E+03	5.32E+06	2.27E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
110827		Cyclohexane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.00E-02	9.11E-06	1.50E-01	25	7,155	353.85	553.55	1.46E+02	5.50E+01	0	6.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	7,941	8.55E-02	3.64E+00	1.76E-04	8.07E-03	0.00E+00	0.00E+00	6.71E-05	6.13E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	3.64E+03	0.45	1.37E+02	8.07E-03	1.80E+03	1.03E+41	9.52E-05	3.47E-01	NA	6.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)	Adjusted Cyclohexane Value (µg/L)
NA	1.80E+04	1.80E+04	5.50E+04	1.80E+04	NA	NA	1.8E+05

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
124481		Chlorodibromomethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.66E-02	1.06E-05	7.83E-04	25	5,900	393.15	678.20	3.18E+01	2.70E+03	0	0

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	6,519	4.94E-04	2.10E-02	1.76E-04	3.70E-03	0.00E+00	0.00E+00	1.06E-04	8.31E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	2.10E+01	0.45	1.37E+02	3.70E-03	1.80E+03	3.11E+89	1.28E-04	2.68E-03	NA	NA

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	0.00E+00	2.70E+06	0.00E+00

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
106934		1,2-Dibromoethane (ethylene dibromide)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
4.30E-02	1.04E-05	6.50E-04	25	8,310	404.75	582.95	3.96E+01	3.91E+03	6.0E-04	9.0E-03

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	10,180	3.16E-04	1.35E-02	1.76E-04	4.35E-03	0.00E+00	0.00E+00	1.52E-04	1.14E-03	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.35E+01	0.45	1.37E+02	4.35E-03	1.80E+03	1.49E+76	1.72E-04	2.32E-03	6.0E-04	9.0E-03

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
1.75E+00	4.05E+03	1.75E+00	3.91E+06	1.75E+00

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95501		1,2-Dichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
5.62E-02	8.92E-06	1.92E-03	25	9,700	453.15	690.35	3.83E+02	1.56E+02	0	2.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	11,813	8.32E-04	3.54E-02	1.76E-04	5.67E-03	0.00E+00	0.00E+00	8.46E-05	7.33E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	3.54E+01	0.45	1.37E+02	5.67E-03	1.80E+03	2.44E+58	1.13E-04	4.01E-03	NA	2.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	5.20E+04	5.20E+04	1.56E+05	5.20E+04

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
106467		1,4-Dichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
5.50E-02	8.68E-06	2.41E-03	25	9,271	447.15	680.65	3.75E+02	8.13E+01	1.1E-05	8.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	11,257	1.09E-03	4.63E-02	1.76E-04	5.56E-03	0.00E+00	0.00E+00	7.40E-05	6.50E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	4.63E+01	0.45	1.37E+02	5.56E-03	1.80E+03	3.85E+59	1.01E-04	4.66E-03	1.1E-05	8.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
4.75E+01	1.79E+05	4.75E+01	8.13E+04	4.75E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75718		Dichlorodifluoromethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.60E-02	1.08E-05	3.43E-01	25	9,421	243.35	385.00	4.39E+01	2.80E+02	0	1.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	8,302	1.91E-01	8.12E+00	1.76E-04	7.68E-03	0.00E+00	0.00E+00	6.36E-05	5.82E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	8.12E+03	0.45	1.37E+02	7.68E-03	1.80E+03	1.39E+43	9.05E-05	7.34E-01	NA	1.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	1.42E+02	1.42E+02	2.80E+05	1.42E+02

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75343		1,1-Dichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.36E-02	1.06E-05	5.62E-03	25	6,895	330.55	534.65	3.18E+01	5.04E+03	1.6E-06	0

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	7,374	3.33E-03	1.42E-01	1.76E-04	8.44E-03	0.00E+00	0.00E+00	8.09E-05	7.32E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.42E+02	0.45	1.37E+02	8.44E-03	1.80E+03	1.64E+39	1.13E-04	1.61E-02	1.6E-06	NA

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
9.47E+01	NA	9.47E+01	5.04E+06	9.47E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
107062		1,2-Dichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.57E-02	1.10E-05	1.18E-03	25	7,643	356.65	563.15	3.96E+01	8.60E+03	2.6E-05	7.0E-03

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	8,477	6.48E-04	2.76E-02	1.76E-04	8.66E-03	0.00E+00	0.00E+00	1.31E-04	1.14E-03	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	2.76E+01	0.45	1.37E+02	8.66E-03	1.80E+03	1.82E+38	1.72E-04	4.74E-03	2.6E-05	7.0E-03

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
1.98E+01	1.54E+03	1.98E+01	8.60E+06	1.98E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75354		1,1-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	Thickness of soil stratum B, (Enter value or 0) h_B (cm)	Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.63E-02	1.10E-05	2.61E-02	25	6,247	304.75	493.95	3.18E+01	2.42E+03	0	2.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	6,450	1.65E-02	7.04E-01	1.76E-04	8.71E-03	0.00E+00	0.00E+00	7.43E-05	6.78E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	7.04E+02	0.45	1.37E+02	8.71E-03	1.80E+03	1.01E+38	1.05E-04	7.39E-02	NA	2.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	2.82E+03	2.82E+03	2.42E+06	2.82E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
78875		1,2-Dichloropropane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.33E-02	9.73E-06	2.82E-03	25	7,590	368.65	572.00	6.07E+01	2.80E+03	3.7E-06	4.0E-03

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	8,583	1.54E-03	6.54E-02	1.76E-04	7.40E-03	0.00E+00	0.00E+00	8.34E-05	7.45E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	6.54E+01	0.45	1.37E+02	7.40E-03	1.80E+03	5.28E+44	1.15E-04	7.52E-03	3.7E-06	4.0E-03

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
8.75E+01	5.55E+02	8.75E+01	2.80E+06	8.75E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
542756		1,3-Dichloropropene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.63E-02	1.01E-05	3.55E-03	25	7,900	385.15	587.38	7.22E+01	2.80E+03	4.0E-06	2.0E-02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	9,152	1.86E-03	7.91E-02	1.76E-04	7.70E-03	0.00E+00	0.00E+00	8.27E-05	7.42E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	7.91E+01	0.45	1.37E+02	7.70E-03	1.80E+03	1.01E+43	1.14E-04	9.05E-03	4.0E-06	2.0E-02

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
6.72E+01	2.30E+03	6.72E+01	2.80E+06	6.72E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414		Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.85E-02	8.46E-06	7.88E-03	25	8,501	409.25	617.15	4.46E+02	1.69E+02	2.5E-06	1.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	10,119	3.85E-03	1.64E-01	1.76E-04	6.91E-03	0.00E+00	0.00E+00	6.48E-05	5.88E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.64E+02	0.45	1.37E+02	6.91E-03	1.80E+03	8.11E+47	9.14E-05	1.50E-02	2.5E-06	1.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
6.50E+01	6.96E+04	6.50E+01	1.69E+05	6.50E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

Adjusted Ethylbenzene Value (µg/L)
650

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
76131		1,1,2-Trichloro-1,2,2-trifluoroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil											
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.76E-02	8.59E-06	5.26E-01	25	6,463	320.85	487.45	1.97E+02	1.70E+02	0	5.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	6,933	3.22E-01	1.37E+01	1.76E-04	3.79E-03	0.00E+00	0.00E+00	3.14E-05	2.87E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.37E+04	0.45	1.37E+02	3.79E-03	1.80E+03	2.08E+87	4.54E-05	6.23E-01	NA	5.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	8.38E+03	8.38E+03	1.70E+05	8.38E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
1634044		MTBE

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.53E-02	8.59E-06	5.87E-04	25	6,678	328.35	497.10	1.16E+01	5.10E+04	2.6E-07	3.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	7,257	3.51E-04	1.50E-02	1.76E-04	7.60E-03	0.00E+00	0.00E+00	1.49E-04	1.25E-03	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.50E+01	0.45	1.37E+02	7.60E-03	1.80E+03	3.70E+43	1.87E-04	2.80E-03	2.6E-07	3.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
3.34E+03	1.12E+06	3.34E+03	5.10E+07	3.34E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108101		Methylisobutylketone (4-methyl-2-

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Looku				Lookup			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.98E-02	8.35E-06	1.38E-04	25	8,243	389.65	574.60	1.26E+01	1.90E+04	0	3.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	9,785	6.90E-05	2.94E-03	1.76E-04	7.05E-03	0.00E+00	0.00E+00	4.84E-04	2.96E-03	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	2.94E+00	0.45	1.37E+02	7.05E-03	1.80E+03	8.76E+46	4.10E-04	1.20E-03	NA	3.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	2.60E+06	2.60E+06	1.90E+07	2.60E+06

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75092		Methylene chloride

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
9.99E-02	1.25E-05	3.25E-03	25	6,706	313.15	510.00	2.17E+01	1.30E+04	1.0E-08	6.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	7,004	1.98E-03	8.43E-02	1.76E-04	1.01E-02	0.00E+00	0.00E+00	1.06E-04	9.48E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	8.43E+01	0.45	1.37E+02	1.01E-02	1.80E+03	6.61E+32	1.45E-04	1.22E-02	1.0E-08	6.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
1.99E+04	5.13E+04	1.99E+04	1.30E+07	1.99E+04

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

Adjusted Methylene Chloride Value (µg/L)
8.0E+03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100425		Styrene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Looku				Lookup			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.11E-02	8.78E-06	2.75E-03	25	8,737	418.15	636.85	4.46E+02	3.10E+02	0	1.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	10,404	1.32E-03	5.61E-02	1.76E-04	7.18E-03	0.00E+00	0.00E+00	8.28E-05	7.37E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	5.61E+01	0.45	1.37E+02	7.18E-03	1.80E+03	1.32E+46	1.14E-04	6.38E-03	NA	1.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	1.63E+05	1.63E+05	3.10E+05	1.63E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

Adjusted Styrene Value (µg/L)
1.6E+06

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79345		1,1,2,2-Tetrachloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Looku				Lookup			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
4.89E-02	9.29E-06	3.67E-04	25	8,996	419.65	661.15	9.49E+01	2.83E+03	5.8E-05	0

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	10,511	1.74E-04	7.43E-03	1.76E-04	4.94E-03	0.00E+00	0.00E+00	2.28E-04	1.59E-03	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	7.43E+00	0.45	1.37E+02	4.94E-03	1.80E+03	9.83E+66	2.35E-04	1.75E-03	5.8E-05	NA

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
2.40E+01	NA	2.40E+01	2.83E+06	2.40E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184		Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Looku				Lookup			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
5.05E-02	9.46E-06	1.77E-02	25	8,288	394.45	620.25	9.49E+01	2.06E+02	2.6E-07	4.0E-02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	9,523	9.02E-03	3.84E-01	1.76E-04	5.09E-03	0.00E+00	0.00E+00	4.58E-05	4.16E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	3.84E+02	0.45	1.37E+02	5.09E-03	1.80E+03	9.91E+64	6.53E-05	2.51E-02	2.6E-07	4.0E-02

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
3.73E+02	1.66E+03	3.73E+02	2.06E+05	3.73E+02

INCREMENTAL RISK CALCULATIONS

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual valu

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108883		Toluene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.78E-02	9.20E-06	6.64E-03	25	7,930	383.75	591.75	2.34E+02	5.26E+02	0	5.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	9,122	3.48E-03	1.48E-01	1.76E-04	7.86E-03	0.00E+00	0.00E+00	7.42E-05	6.72E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.48E+02	0.45	1.37E+02	7.86E-03	1.80E+03	1.44E+42	1.04E-04	1.54E-02	NA	5.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	3.38E+05	3.38E+05	5.26E+05	3.38E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

Adjusted Toluene Value (µg/L)
3.4E+06

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
120821		1,2,4-Trichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.96E-02	8.40E-06	1.42E-03	25	10,471	486.65	726.45	1.36E+03	4.90E+01	0	2.0E-03

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	13,189	5.58E-04	2.38E-02	1.76E-04	4.00E-03	0.00E+00	0.00E+00	8.60E-05	7.09E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	2.38E+01	0.45	1.37E+02	4.00E-03	1.80E+03	6.44E+82	1.10E-04	2.61E-03	NA	2.0E-03

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	8.00E+02	8.00E+02	4.90E+04	8.00E+02

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71556		1,1,1-Trichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Looku				Lookup			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.48E-02	9.60E-06	1.72E-02	25	7,136	347.15	584.65	4.39E+01	1.29E+03	0	5.0E+00

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	7,684	9.98E-03	4.25E-01	1.76E-04	6.54E-03	0.00E+00	0.00E+00	5.74E-05	5.23E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	4.25E+02	0.45	1.37E+02	6.54E-03	1.80E+03	4.03E+50	8.16E-05	3.47E-02	NA	5.0E+00

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	1.50E+05	1.50E+05	1.29E+06	1.50E+05

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79005		1,1,2-Trichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.69E-02	1.00E-05	8.24E-04	25	8,322	386.95	602.00	6.07E+01	4.59E+03	1.6E-05	2.0E-04

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	9,556	4.19E-04	1.78E-02	1.76E-04	6.75E-03	0.00E+00	0.00E+00	1.40E-04	1.16E-03	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.78E+01	0.45	1.37E+02	6.75E-03	1.80E+03	1.06E+49	1.75E-04	3.13E-03	1.6E-05	2.0E-04

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
4.87E+01	6.67E+01	4.87E+01	4.59E+06	4.87E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016		Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.87E-02	1.02E-05	9.85E-03	25	7,505	360.35	573.35	6.07E+01	1.28E+03	4.1E-06	2.0E-03

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	8,330	5.46E-03	2.33E-01	1.76E-04	6.93E-03	0.00E+00	0.00E+00	6.38E-05	5.79E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	2.33E+02	0.45	1.37E+02	6.93E-03	1.80E+03	5.91E+47	9.01E-05	2.10E-02	4.1E-06	2.0E-03

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
2.83E+01	9.95E+01	2.83E+01	1.28E+06	2.83E+01

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

Adjusted TCE Value (µg/L)
20

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75694		Trichlorofluoromethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Looku				Lookup			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
6.54E-02	1.00E-05	9.70E-02	25	5,999	296.85	471.15	4.39E+01	1.10E+03	0	0

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	6,125	6.29E-02	2.68E+00	1.76E-04	6.60E-03	0.00E+00	0.00E+00	5.51E-05	5.03E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	2.68E+03	0.45	1.37E+02	6.60E-03	1.80E+03	1.55E+50	7.86E-05	2.11E-01	NA	NA

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	0.00E+00	1.10E+06	0.00E+00

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014		Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
SL	1.62	0.387	0.103								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.07E-01	1.20E-05	2.78E-02	25	5,250	259.85	424.61	2.17E+01	8.80E+03	4.4E-06	1.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	ERROR	ERROR	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	4,951	1.96E-02	8.34E-01	1.76E-04	1.08E-02	0.00E+00	0.00E+00	9.15E-05	8.36E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	8.34E+02	0.45	1.37E+02	1.08E-02	1.80E+03	4.18E+30	1.28E-04	1.07E-01	4.4E-06	1.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
5.17E+00	9.75E+02	5.17E+00	8.80E+06	5.17E+00

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)	Adjusted Vinyl Chloride Value (µg/L)
NA	NA	1

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.

DATA ENTRY SHEET

NJ-GW-ADV-JAN2013
USEPA Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [X]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [ ]

NOTE: SEE SPECIAL INSTRUCTIONS FOR METHYLENE CHLORIDE, TRICHLOROETHENE, AND VINYL CHLORIDE ON RESULTS PAGE

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
1330207		Xylenes (total, avg. of 3 J&E values)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
13	200	445	445			A	SL	SL		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Looku				Lookup			
SL	1.62	0.387	0.103	SL	1.62	0.387	0.103	SL	1.62	0.387	0.103

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	--	1,000	1,000	366	--	0.45	8.22

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.47E-02	9.90E-06	5.18E-03	25	8,570	411.65	621.18	3.83E+02	1.06E+02	0	1.0E-01

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	245.3128	0.284	0.284	0.284	0.184	5.96E-09	0.901	5.37E-09	25.00	0.387	0.067	0.320	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
4.58E+04	1.80E+06	1.00E-03	200	10,216	2.51E-03	1.07E-01	1.76E-04	8.56E-03	0.00E+00	0.00E+00	8.45E-05	7.63E-04	245.3128

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^T)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
200	1.07E+02	0.45	1.37E+02	8.56E-03	1.80E+03	5.10E+38	1.18E-04	1.26E-02	NA	1.0E-01

END

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	8.29E+03	8.29E+03	1.06E+05	8.29E+03

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA

Adjusted Xylene Value (µg/L)
8.3E+04

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)
MESSAGE: The values of Csource and Cbuilding on the INTERCALCS worksheet are based on unity and do not represent actual values.

SCROLL DOWN TO "END"

END

NOTE: methylene chloride, trichloroethene, and vinyl chloride must have an adjustment factor applied because they are considered mutagens and USEPA applies different calculations to these three chemicals. The factors are: methylene chloride, 0.40; trichloroethene, 0.72; vinyl chloride, 0.29. For these three chemicals, the J&E result is multiplied by the chemical specific factor.